The Chemical Age

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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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The Chemical Engineer "Arrives"

THE articles, notes, and illustrations published in this issue on the subject of chemical plant are sufficient proof of the definite status that the science or art of chemical engineering has now attained. Its recognition has come rapidly. It seems only yesterday since people were joking about the new hybrid type which had come into existence—neither chemist nor engineer but a mysterious admixture of both. Already that is a thing of the past; the new type is accepted as indispensable to the equipment of industry. As the means of training extend the standard of efficiency must necessarily be raised and the scope for service constantly widen.

The practice of chemical engineering at present is actually in advance of theory, but a comparison of two accepted definitions may not be without interest. In the United States, where chemical engineering was organised earlier than here, the accepted definition runs:—

> Chemical engineering as a science, as distinguished from the aggregate number of subjects comprised in courses of that name, is not a composite of chemistry and mechanical and civil engineering, but a science of itself, the basis of which is those unit operations which in their proper sequence and co-ordination constitute a chemical process as conducted on the industrial scale.

According to the British definition, adopted by the recently founded Institution:

> A chemical engineer is a professional man experienced in the design, construction, and operation of plant and works, in which matter undergoes a change of state and composition.

And further it is suggested that

> a chemical engineer should not be, therefore, a highly specialised man but rather one who possesses a thorough general knowledge of chemical reactions and physical laws, combined with a thorough grasp of the principles of mechanical and electrical engineering and those branches of civil engineering dealing with the strength of raw materials and theory of design and construction.

The increased attention to chemical engineering here and elsewhere is but the natural outcome of the modern advance in chemical technology. As Sir William Pope points out, in a note to which allusion was made last week, the aims and objects of industrial chemistry have greatly changed within even one generation. The older chemical manufacturer was mainly concerned with the device of methods for the large scale preparation of substances of simple composition and already familiar as natural or laboratory products. Ludwig Mond and Ernest Solvay, for example, spent their early days in elaborating economical processes for the manufacture of the common alkalis and acids. The introduction of coal-tar dyes greatly increased the complexity of chemical industry, and a need arose for the large scale production of great numbers of substances unknown or only recently known to chemical science. Thus, not only had the technologist to apply to industrial purposes the newest results of pure research, but he sometimes even forestalled the scientific worker in his own field. Sir William Pope quotes three notable cases. Mond's discovery of nickel carbonyl in 1890 and its utilisation in the large scale manufacture of pure nickel is one. Moissan's work, again, on the metallic carbides was so extended by the technologist that it led to the cheap production of calcium carbide and provided acetylene, previously a laboratory curiosity, in unlimited quantity for use in industry. The cyanamide industry, which Sir William suggests may some day furnish urea as the ideal fertiliser, came into existence practically without the collaboration of the academic chemist. In these changes chemistry, physics, engineering, and technology are all involved, and the grasp of all the new conditions entails some kind of collective technology for which chemical engineering is a convenient name.

Chemical plant is an essential branch of this field, and our plant manufacturers are not only well maintaining the British tradition of sound workmanship but are keeping well abreast of new progress. The quality of British plant has long been one of its best features. American and German stuff may be more

attractively marketed, perhaps, though even here we have been moving ahead, but we have heard of cases in which its length of life and its freedom from running troubles have fallen short of expectation. What buyers of British plant all over the world do know is that, once installed, it functions as it was meant to do and refuses to be worn out. The saving in repairs, stoppages, and worries usually more than compensates for any small increase in initial outlay. The range of production, too, is such that users now have rarely to look to foreign sources for their supplies.

This care for sound material and good design and construction is fortunately combined with an alert outlook towards the new problems that are arising and with remarkable activity in invention. The review in this issue of the leading types of colloid mills shows the foremost place that British manufacturers and designers have won and hold in this important field. The Stream-Line Filter is another example of British enterprise. In its experimental stage it attracted much attention; our illustrations and descriptive notes show the progress made in overcoming the inevitable difficulties in transferring the invention from the experimental to the large scale commercial stage and in adapting the basic idea to special industrial uses. The extremely important study of high pressures and atmospheres, as indicated in recent editorial notes and in the paper read by Dr. E. B. Maxted last week in Liverpool, is now being seriously approached from the commercial side by private interests as well as from the disinterested scientific side by the new chemical research staff at Teddington. A decade ago it used to be said that we had no chemical engineers in this country, and it required some nerve to assert the contrary. That reproach has already been removed and chemical technology is one of the fields in which steady progress may confidently be predicted.

Modern Drying Machinery

The process of drying constitutes an important operation in a very wide range of industries. It is, in fact, no exaggeration to say that there is scarcely any industry which is not concerned with the process in some form or other, and in many cases it proves perhaps the most troublesome link in the chain of manufacturing operations. It has been said that the objects of drying (by which term, incidentally, is usually meant the removal of water from solid or semi-fluid materials by a process of vaporisation conducted at temperatures below that of the boiling point of water) are almost as diverse as are the materials submitted to it, and when the subject is considered in detail one is struck with the vast number of substances that require to be passed through some such process, and the bewildering variety of machinery that has from time to time been introduced for the purpose. To quote a few examples which appertain more particularly to the chemical and associated industries: ores may frequently have to be dried to increase the capacity of calcining plant, certain materials have to be dried to bring their water content to a standard value for sales purposes, many dried waste products of an organic nature find a use as fertilisers and cattle foods, while in other cases the removal of water has to be undertaken in order to effect economy in freight or to facilitate handling.

It is not, perhaps, generally appreciated that the principles and practice of drying form a definite and organised branch of chemical engineering which of late years has received a large share of the attention of plant designers. The subject has undoubtedly suffered from the lack of literature in easily accessible form, with the result that those in charge of works, being in ignorance of the work which has been carried out by others, have in many cases introduced plant of haphazard design and indifferent efficiency. It should, therefore, be a matter of interest for many of our readers to know that included in the new volumes which are to be published within the next few weeks in the Chemical Engineering Library is one entitled "Modern Drying Machinery," which has been specially written for the series by Dr. H. B. Cronshaw. The book, we feel, should be of particular utility to those engaged in the practical side of technical chemistry for the reason that it not only treats fully of the principles of the subject, but there is also included a discussion of design and principles involved in almost all existing forms of drying machinery. A perusal of Dr. Cronshaw's book leaves the impression that in evolving apparatus of the kind there are many pitfalls for the partly experienced designer, and that while the general design of a drying plant is primarily determined by the chemical and physical characteristics of the material to be treated, there are many more important items to be taken into account. A golden rule would seem to be to aim at simplicity in construction and operation, and in the interests of this it is frequently desirable to sacrifice even some measure of efficiency.

Dr. Levinstein's Address

The presidential address on "Philosophy in the Market Place," which Dr. Levinstein delivered on Tuesday before the Manchester Literary and Philosophical Society, is one of those stimulating contributions that it has become his custom to give us from time to time. In it, as usual, criticism and construction are pleasantly balanced, and both are supported by learning and experience. People, as he says, are nowadays readjusting their attitude towards science, and particularly towards the inventive industries, and his suggestions are framed with a view to these conditions. He is on painfully familiar ground in reminding us of the number of chemical discoveries made here which have been commercially exploited in other countries, and he analyses the causes in some detail. It is, as he says, sheer waste for a commercial firm to employ a research staff unless it is able to estimate the commercial value of the results. It can only possess such knowledge by including in its controlling and directing departments those special types of industrialists who combine both the commercial and the scientific qualifications.

Moreover, he holds it to be a mistake in many cases to attribute to the chemist alone the discovery of several of the processes associated with his name. The three outstanding chemical successes of recent years are the B.A.S.F. Indigo, the Haber, and the Viscose processes, but here, as Dr. Levinstein shows in

detail, the original discovery of the laboratory was developed at great expense by the companies that took it up, and by the time the full commercial stage had been reached the company had contributed as much as, or even more than, the original inventor. In the initial stage such commercial undertakings look rather like a gamble to the outsider; what alone saves them from being the gamble they look is the intimate inside knowledge, the finely balanced and trained sense of possible failure and possible success, the combined commercial and scientific instinct for detecting in the embryonic stage ideas that will ultimately work out right commercially. It is on these and similar grounds that Dr. Levinstein bases his plea for the management of scientific industries by men of science.

An interesting suggestion in the address relates to a new function for the Chemical Research Laboratory at Teddington. Privately employed research staffs, he points out, become largely intelligence staffs, engaged in the examination of new patents and in the rapid reporting of their contents. The suggestion is that this work of watching all foreign patents should be handed over to Teddington, and that the Chemical Research Laboratory should become the technical intelligence headquarters of the British chemical industry. In practice this would mean that every foreign patent of chemical interest would be examined at Teddington immediately on its publication, and a preliminary report made on its value or non-value. The idea is interesting, but one would like to hear what others, and especially Teddington itself, think of it before expressing any definite opinion.

A New Use for Apatite

AMONG important researches recently carried out at Pusa, that regarding the utilisation of Indian deposits of apatite promises considerable possibilities in connection with Indian agriculture. We learn from a trustworthy source that a successful method has been worked out for the preparation of dicalcic phosphate from apatite, which is found in abundance in some parts of Bihar. This depends on the solution of the mineral in perchloric acid and the subsequent precipitation of the dissolved phosphoric acid as lime phosphate. When a solution of sodium perchlorate is electrolysed, perchloric acid and caustic soda are formed in the anode and cathode compartments respectively. The experimental conditions under which a high current efficiency is attained have been determined. The mineral phosphate is treated with the anode solution, which extracts the phosphoric acid. The addition of a suitable proportion of the cathode solution causes the precipitation of dicalcic phosphate and the formation of sodium perchlorate. The sodium perchlorate thus regenerated can again be electrolysed and used.

The phosphate of lime obtained by this process contains about 35 per cent. phosphoric acid (the amount theoretically present in dicalcic phosphate is 41·27 per cent.). Almost the whole of this phosphoric acid is citrate-soluble and so available for the needs of plants, and in certain types of soils the product would be as effective as, or perhaps better than, superphosphate. The Indian deposits of apatite are at present not being properly utilised. The high price of sulphuric acid stands in the way of their employment in the manufacture of superphosphate. In the electrical process described above there is no consumption of chemicals, as the sodium perchlorate used regenerates itself. Where cheap electrical energy is available, for example, from natural sources of water power, it is thought that it would be possible to provide Indian cultivators with an efficient phosphatic manure.

The Case of Sir Alfred Mond

THE principal political incident of the week has been the announcement that Sir Alfred Mond has resigned from the Liberal Party and decided to join the Conservatives. It is outside the province of this journal to discuss the political aspects of his decision, but there is a widespread feeling among people of all parties that Sir Alfred's knowledge of business, finance, and science and the ability he has latterly exhibited in debate on industrial problems would be an asset to any Government. There is another point on which, without distinction of party, public sympathy will be extended to Sir Alfred. That is, in the offensive character of the personal references to him made by some of his former colleagues. When public men find that they cannot support particular policies before the country it is simply an act of honesty to make their position known; if they did not, it would be adding to the existing stock of political insincerity. Sir Alfred has met these personal attacks with the dignified silence which his many friends in the chemical industry would expect and which will add to their estimate of himself and his public services.

The Calendar

Feb.		
1	Society of Chemical Industry (London Section): "The Training of Chemists for Industry." Francis H. Carr. 8 p.m.	Institution of Mechanical Engineers, Storey's Gate, London.
1	Institution of the Rubber Industry (London Section): "A Comparison between British and American Manufacturing Methods." Colin Macbeth, 8 p.m.	Engineers' Club, Coventry Street, Piccadilly, London, W.
2	Hull Chemical and Engineering Society: "Some Aspects of Fermentation." Harold C. Hotblack. 7.45 p.m.	Grey Street, Park Street, Hull.
2	Society of Chemical Industry (South Wales Section): "Medicinal Fine Chemicals." W. J. U. Woolcock.	Lecture Theatre, Instituteof Engineers, Park Place, Cardiff.
2 and 9	Royal Institution: "Surface Action." Eric K. Rideal. 5.15 p.m.	21, Albemarle Street, London, W.1.
3	Royal Society of Arts: "Investigations in Agricultural Science at Rothamsted." Sir Edward John Russell. 8 p.m.	John Street, Adelphi, London, W.C.2.
3	Society of Public Analysts: Annual General Meeting. 8 p.m.	Burlington House, Piccadilly, London, W.1.
4	Institute of Chemistry (Bristol Section): "The Smokeless Fuel Problem." Dr. A. Parker. 7.30 p.m.	The University, Woodland Road, Bristol.
4	Chemical Society: Ordinary Meeting. 8 p.m.	Burlington House, Piccadilly, London.
5	Society of Chemical Industry (Manchester Section): "Fluid Heat Transmission for High Temperatures in Industrial Purposes." J. Arthur Reavell. 7. p.m.	16, St. Mary's Parsonage, Manchester.
6	Society of Chemical Industry and Institute of Chemistry (Birmingham Sections): Annual Dinner. 7 p.m.	Engineers' Club, Waterloo Street, Birmingham.

Psychology of Design: Its Bearing on Chemical Plant

By Geoffrey Weyman, D.Sc., F.I.C.

It must be apparent, to those who stop to think, that design is in reality the exercise of forethought, and to design successfully calls not only for the knowledge born of experience, but for imaginative faculties which in all probability are innate and seldom acquired. The incidence of this visualisation on modern chemical plant is dealt with in a most engaging and original manner by Dr. Weyman in the volume which he has just contributed to the "Chemical Engineering Library," extracts from which we give below by permission of the publishers.

To design successfully one must look ahead and imagine the circumstances which will surround the plant. It is necessary to visualise or construct a mental picture. The designer must be able to "see through a brick-wall," or, more commonly, a cast-iron plate, and visualise the inside. And more, the mental picture must be a moving one; the movement of the working parts, and of the operators as well, must be pictured exactly as will ultimately come about. Often, designs would be quickly erased if the designer had visualised the plant in this manner and had realised the ridiculous results obtained with over- or under-loaded units, and the strain and inconvenience he had unwittingly caused the operators. The designer commonly pictures the plant in the drawings, but seldom visualises the plant in operation.

To design correctly, therefore, we must have visualisation, we must employ the imagination and cultivate the faculty of forming clear mental pictures. Transference to paper is then an easy process.

The general requirements should, in the first place, be laid down by the technical staff and will include the productive capacity, the approximate amount of raw materials (including fuel, water, and steam) to be handled, the type of operation, the types of units, the materials to be used where special, the amounts and nature of the effluents and wastes, the direction of disposal of products, the choice of site, and the possibilities of future requirements. This statement is preferably accompanied by a rough sketch or flow sheet showing the sequence of operations and indicating the possibilities of heat interchange, water circulation, and steam travel.

The draughtsman using this as a basis will draw out one or more preliminary proposals showing the general arrangement and giving a rough over-all cost. The technician is then called upon to amend or approve the proposal and to state the approximate material, labour, and maintenance costs. The scheme having been generally approved, the technical staff must convey to the draughtsman their ideas as to detailed placing of the units, means of interconnection, position and type of controls with all the necessary specifications. Detailed drawings can then be got out with final specifications. It is very useful to have one or more models showing the proposed plant as finally erected with the quantities, direction of travel, and position of controls marked. This encourages visualisation. Some firms have the final drawings and specifications initialled by all those concerned down to the actual plant supervisor—a practice which not only encourages the interest of the staff, but which gives them a sense of responsibility which is distinctly valuable.

The Duties of Operators and Designers

Far too much of the chemical plant seen in operation is a confused tangle of pipe-work, tanks, and units of various types. There is no definite arrangement. Many of the chief means of control are in inaccessible places. The number of operators is unnecessarily large, and these have to exert themselves physically and mentally to an unjustifiable extent. As often as not the operators waste half their time in climbing over, up, or around obstacles to reach valves or to read gauges. Those who have actually been in charge of plant realise only too well what it means to work a badly-designed and arranged plant, but unfortunately a wide gap exists between the operators and the designers. This gap should be bridged by the technical staff, but the tendency is for the latter only to consider broad essentials, and to leave the detail on which so much depends to plant-makers who are more concerned to fit the plant in cheaply than with its ultimate convenience.

In some cases, the whole construction and erection of plants are let out to contractors, and invariably units will be purchased from makers of plant specialities after approval of general drawings. A contracting firm is usually called upon to guarantee certain results, *i.e.*, that of the raw material which goes in so much will come out in products, or that the production shall reach so many tons per day with a certain steam consumption, or that the product shall be of a 90 per cent. purity; but no plant-maker can or will guarantee that the plant shall be economical, or shall give a definite return on the capital outlay. Obviously, it does not matter what any particular efficiency is if the cost of obtaining it is prohibitive. Better to sacrifice efficiency for the sake of economy. A plant-user hesitates to modify plant owing to the risk of invalidating possible guarantees, and it is to be feared sometimes asks for efficiencies which aggregate to over 100 per cent. Plant-makers, on the other hand, are naturally anxious to standardise their plants as far as possible, and are chary of accommodating their designs to suit local conditions.

A little more confidence and appreciation of the difficulties on both sides would be to the benefit of all. The party who should be in a position to appreciate the problem and formulate an economical plant is the plant-user, and the data necessary must come in the first place from him. The plant-maker will then be able to use his experience in the construction of plant to put forward suitable forms. If the plant-user cannot, or will not, supply detailed information it is hardly fair to extort guarantees from a plant-maker. Guarantees are, in fact, only a paper safeguard. The plant-maker insures himself against possibility of penalty, either in his price, or by employing a huge safety factor which leads to high running costs. No guarantee is really sufficient to repay a plant-user for loss consequent on uneconomical plant. The plant-user had far better face his responsibility and decide for himself as to the design and arrangement which is going to work economically under his particular local conditions.

Unfortunately, if a manufacturer or plant-user decides to design and erect the plant himself, there is a great tendency to build up the plant piecemeal, a procedure which leads to temporary expedients and inconvenient arrangement. In recent years the education and training of technical staffs have been so much improved that such faulty procedure should be easily obviated. It is only necessary that the planning of the proposed plant should be undertaken systematically from the start. The necessary preliminary information must be collected carefully and checked and the possibilities of the future accurately forecast before any attempt is made to lay down detail. The exact method and means of operation should be kept in view from the very first. The principle should be held "save a man's fingers and use his brains." No one can exert his full mental powers if he is physically tired. Modern plant requires all the mental effort available to secure the best results.

Preliminary Considerations

Too much stress can hardly be laid on the necessity for obtaining reliable and precise information on which to base the design and arrangement of plant. It is very awkward to find when a plant is erected that certain units are too small in capacity to keep the remaining plant at full load, or that the arrangement, while permitting of the easy and convenient handling of raw materials and saleable products, does not permit of the cheap and easy disposal of some waste product or noxious effluent.

In order to obtain the true relationship of the various units of a plant it is convenient to classify them into groups as follows:—1. Preparation Plant. 2. Reaction Plant. 3. Separation Plant. The Preparation Plant is for the purpose of purifying or concentrating raw materials, and for bringing them to a suitable physical state for reaction. The actual chemical reactions are carried out in the Reaction Plant, which must maintain suitable conditions for reactions. Reaction Plant is not always the most important section. In fact, it often happens in chemical industry that the objects are merely concentration and separation. Secondary reactions, however, commonly occur which have to be kept under good control for economical working. After reaction

the products have to be separated and refined in the Separation Plant, which brings them to a state suitable for the market. While it is quite common to combine the functions of these classes of plant in one unit, the tendency of plant development is to relieve the reaction plant of as much work as possible, so that the most delicate control can be secured. Units designed for one object only can obviously be made more efficient. Similar units often function both in the Separation and Preparation Plant, but the capacity may be different and sometimes the object or effect is not the same. The extent to which these classes of plant are economically justified is an important point to decide. The Preparation Plant does not usually affect the value of the product except as regards its purity, but acts by reducing the operating costs. Separation Plant may make all the difference to the final value of the product, and in any case the increase in value in the final stages of refining is very much larger in proportion to the expenditure than it is on the rest of the plant. No trouble should be spared to make the products fit their final commercial purposes, as if they have to pass through the hands of other manufacturers before they become articles of commerce the margin of profit is likely to be small.

There is a considerable choice in the type of units which can be employed, and the selection will depend on the properties of the materials to be dealt with, the desired form ultimately required, correlation with other plant, and the relative capital and running costs.

Capacity of Plant

It is imperative that the capacity of the plant shall have a close relation to that normally required. With plant of a certain size the labour costs, repair and maintenance charges, and the capital charges tend to remain the same whatever the output may be. Even material charges are sometimes heavier for an under-worked plant owing to decreased efficiency. With a plant of too great a capacity capital is wasted, while if too small the operating costs are too high per unit of production.

In many cases variations can be overcome by providing greater storage accommodation and by working the plant at intervals only, although it is designed on the continuous system. An alternative is to use smaller units in such a way that one or more may be laid off as required, but the capital cost and usually the labour costs per unit of production will be higher. Intermittent plant is not so much affected provided the labour can be absorbed while plant is laid off to accumulate fresh supplies of materials. Seasonable variation can be more easily dealt with, although the return will never be so high in the periods of smaller production. Occasionally it may be necessary to allow material to go to waste if insufficient in quantity; always provided it can be easily disposed of.

Apart from other considerations, some units of plant cannot be worked efficiently at much higher or lower than a certain fixed capacity. Other types do not suffer in efficiency to any great extent when worked at low capacity. A compromise is therefore often advisable in which certain units are installed of high capacity worked intermittently, while the rest are of definite capacity worked on an even load.

The working losses of material have also to be considered. In most cases the losses are lower with large-scale plant, and with intermittent type of plant it is best to keep the capacity on the high side and use the units less frequently. For example, in the treatment of one liquid by another and subsequent separation of the two liquids the losses are higher if the units are sub-divided and the materials treated in small quantities. An acid washer for treatment of oils is properly made in very large units, although the unit may be out of all proportion to the rest of the plant, and used perhaps only once in several days.

A further consideration is the possibility of future increase in production. Unless the future increase is very definite it is not advisable to risk incurring increased running costs and capital outlay in designing a plant of such a capacity as to absorb such increase. A better plan is to compromise in the installation of large units in those instances where efficiency is not interfered with, and to allow for duplication of units in other instances.

Local Conditions

The general site of a plant is usually fixed by the character of the raw materials. Gases cannot be economically transported more than a short distance, and unless of high value, liquids and solids are only conveyed at prohibitive prices. On the other hand, most chemical products are highly concentrated. The plant is, therefore, usually placed near the source of the most important raw material. The immediate site is often fixed by the necessity of correlation with other plant which supplies the raw materials or deals with the products. This tends to spoil systematic arrangement and makes elevated plant necessary in order to economise ground space. It is important that the actual feed of material through various units should be under gravity which is easy to control. To avoid an undue number of small elevators and similar plant the units are placed as far as possible one below the other, the raw materials being elevated in one stage to the highest point.

Easy access to road, rail, or water for the disposal of products is often of great value, while a not unimportant consideration lies in placing a plant where the disposal of waste products and effluents can be satisfactorily dealt with. Local dumps, though cheap in the first place, are apt to be expensive in the long run. The cost of disposal often makes it profitable to treat waste products for the recovery of some constituent, or to concentrate in some way to reduce the bulk. In no case should waste products be allowed to pass away till all their possibilities have been investigated. In many cases the position of the plant will be the determining factor in the question whether such products should be treated or not. The regulations as to the disposal of effluents and waste gases, which might be objectionable if discharged into drains or the atmosphere, are becoming more stringent, and this makes it all the more necessary to keep the means of disposal of waste products in mind when laying out plant.

The levels of a site and its adaptability are well-known considerations to be borne in mind. Excavation is costly, but a certain amount may be entered upon if it will bring the main working level close to the mean ground level. A dry position is of great advantage in many cases. Almost all substances are hygroscopic, and the moisture content of a substance stored in bulk under cover will vary several per cent., according to the humidity of the air. The variation is such as to require the artificial heating of stores in some places if dryness of products is of importance. Atmospheric conditions may cause some concern in the choice of a site. Plant placed in the open should not be subject to the full blast of the prevailing wind. Apart from the possible effect on the process carried out by the difference in temperatures so produced, it is not to be supposed that workmen will give adequate attention to plant in very exposed positions. Distinction must be drawn between different units, some of which are not affected by exposure and others which it is imperative to place under cover.

U.S. Lime Production

Sales of lime by manufacturers in the United States in 1924 amounted to 4,072,000 short tons, valued at $39,596,423 f.o.b. kilns, according to the Bureau of Mines, Department of Commerce. These figures show a reduction in quantity of less than 1 per cent. and in value of about 1 per cent. from the 1923 figures of 4,076,243 tons and $39,993,652. The average value per ton at the kilns in 1924 was $9·72, compared with $9·81 in 1923. Lime sold for chemical uses amounted to 1,653,964 tons, valued at $14,719,974, a decrease of 3 per cent. in quantity and 6 per cent. in value. Lime sold for agricultural purposes amounted to 248,336 tons, valued at $1,864,514, an increase of 3 per cent. in quantity and 2 per cent. in value. The sales of hydrated lime in 1924, included in the above total, were 1,316,664 tons, valued at $13,199,846, an increase of 7 per cent. in quantity and 8 per cent. in value. About 78 per cent. of the hydrated lime sold—1,029,384 tons, valued at $10,420,151—was for construction work. This was an increase of 12 per cent. in quantity over 1923. Hydrated lime for chemical uses (158,870 tons, valued at $1,618,873) and for agricultural purposes (128,410 tons, valued at $1,160,822) both showed decreased sales as compared with 1923.

Although lime is manufactured in 40 of the States and in the territories of Hawaii and Porto Rico, over 98 per cent. of the production comes from 22 States.

The *Stream*-Line Filter in various Types

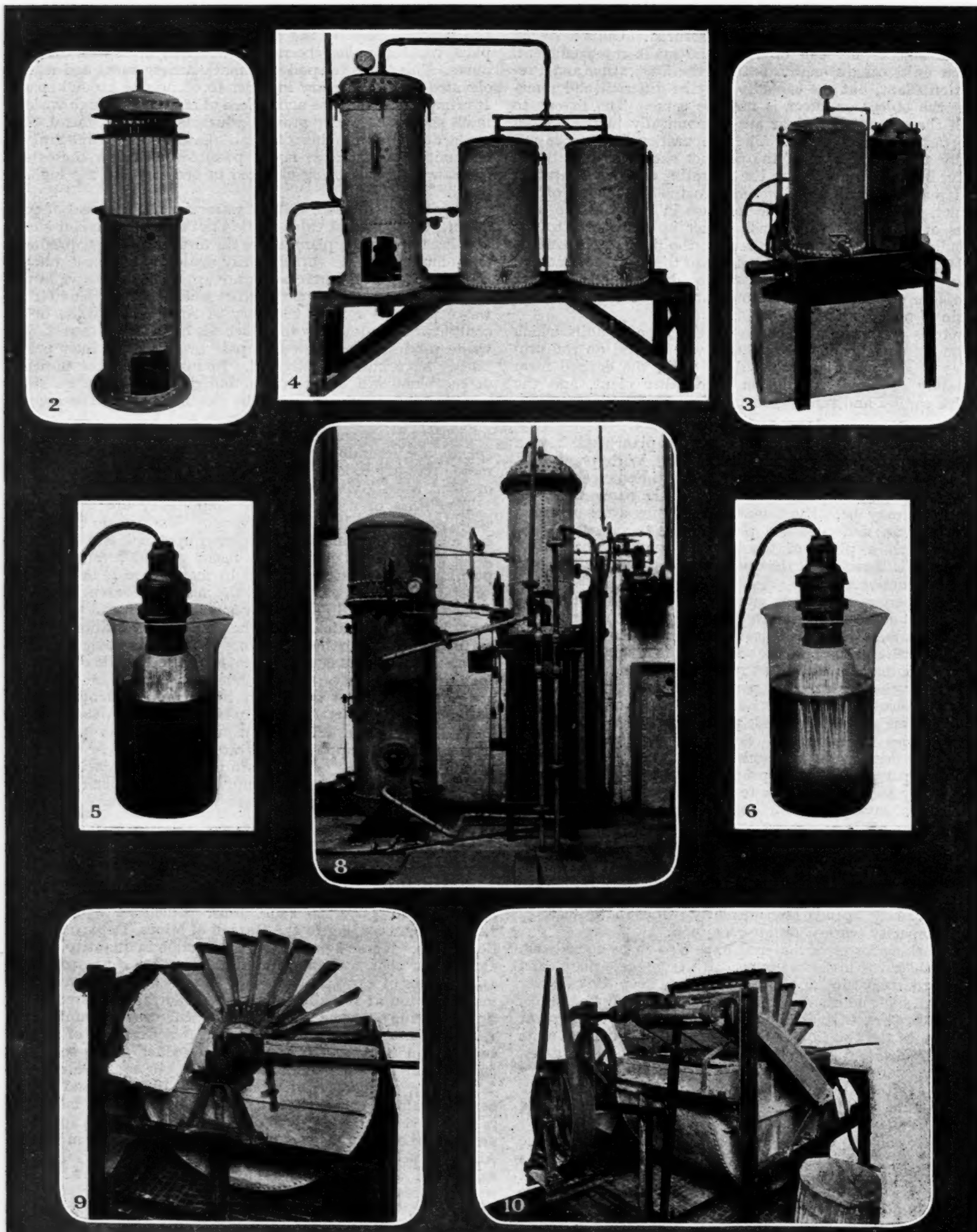


FIG. 2. Filter with interior exposed.
,, 3. Small self-contained unit.
,, 4. Larger Type of Filter.

FIG. 5. Electric bulb in unfiltered oil.
,, 6. Ditto, in filtered oil.
,, 8. Filter for dirty dry-cleaning spirit.

FIG. 9. Automatic Rotary Filter, showing cake delivery.
,, 10. Ditto, showing scraper.

Recent Developments in the Stream-Line Filter

Adaptation to New Industrial Uses

The following notes on the most recent developments in connection with the Stream-Line Filter are of very wide industrial interest. They show that the inevitable problems attending the transition from the experimental or laboratory scale to actual commercial large-scale conditions are steadily being overcome by research and experiment, and that so confident are the company of the satisfactory commercial functioning of the three different grades of the filter they are now manufacturing that they are able to guarantee a life of from six to twelve months.

THE Stream-Line Filter is now being manufactured in a number of standard sizes with outputs ranging from one to 1,000 gallons per hour. A large amount of research has been done on the nature and treatment of the paper necessary to ensure that the filtering medium should have a reasonable life. Three different grades which cover the majority of the requirements of filter users are now manufactured, for which a life of six to twelve months can be guaranteed. The standard filters are arranged for periodic cleaning by means of compressed air or steam, the solid matter being discharged through a sludge cock by the operation of the necessary valves without the necessity for dismantling any portion.

Fig. 1 shows a cross section of a typical filter. The filtering medium is built up of paper washers which form cylindrical columns compressed by means of spiral springs. The prefilt passes through the columns from the outside and the filtrate passes into the upper chamber through the holes in the respective columns. The solid matter is thus left on the outside of the paper columns and compressed air is used at intervals to break up the cake thus formed, which drops into the hopper bottom and is discharged through the sludge cock. Fig. 2 gives some idea of the external appearance of the filter and of the paper columns.

Among the purposes for which filters have been or are being installed are the clarification of varnish, sugar liquors, beer, chalky water, dry cleaning spirit, oil, etc. Particulars of specific plants may be of interest.

Recovery of Crankcase Oil

Fig. 3 shows a small filtering plant for the recovery of used crankcase oil and Fig. 4 a larger one for the same purpose. The recovery of oil, particularly for the crankcase of internal combustion engines, is a matter of considerable commercial importance. Some idea of the cost of lubrication may be gathered from the report just published concerning British electricity stations operated by Diesel engines, in which the average lubricating oil cost works out to 10 per cent. of the total running costs of the plants. It is believed that the Stream-Line Filter offers, for the first time, a successful plant on a commercial scale that will entirely free such oil from the harmful carbon asphaltene and other solid matter. One user who is filtering the oil from a number of cold starting engines by this process estimates his yearly saving at £2,000.

The report of an independent consulting chemist on a sample of oil before and after treatment contains some convincing results. Taking three samples of lubricating oil, representing (*a*) Diesel engine lubricating oil, before use, (*b*) the same oil after use in a Diesel engine, and (*c*) the same oil as (*b*) after filtration through a Stream-Line Vacuum Filter, the oils had the following characteristics:—

(*a*) *Original Oil.*

Specific Gravity at 60° Fah.	0·8855
Colour	..Light red with greenish florescence.
Flash Point (closed)—Pensky-Marten	390° Fah.
Viscosity (Redwood) at 60° Fah.	930 secs.
,, ,, ,, 70° Fah.	643 secs.
,, ,, ,, 140° Fah.	101·8 secs.

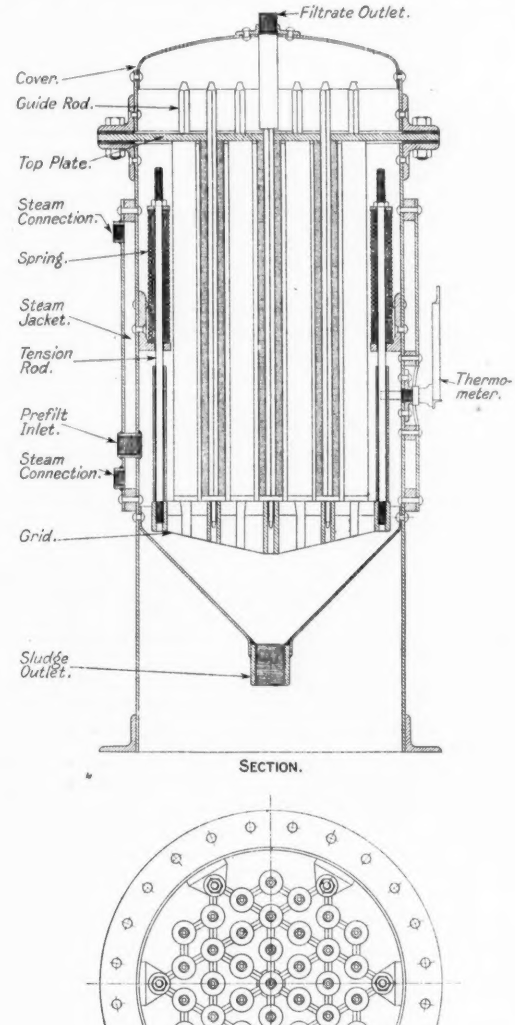
(*b*) *Used Oil, Unfiltered.*

Specific Gravity at 60° Fah.	0·8952
Colour	..Black, due to finely divided carbon in suspension.
Flash Point (closed)—Pensky-Marten	370·4° Fah.
Viscosity (Redwood) at 60° Fah.	1,207 secs.
,, ,, ,, 70° Fah.	823 secs.
,, ,, ,, 140° Fah.	126 secs.

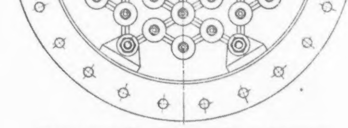
(*c*) *Used Oil, Recovered by Filtration.*

Specific Gravity at 60° Fah.	0·8891
Colour	..Deep red, no florescence.
Flash Point (closed)—Pensky-Marten	393·8° Fah.
Viscosity (Redwood) at 60° Fah.	1,089 secs.
,, ,, ,, 70° Fah.	740 secs.
,, ,, ,, 140° Fah.	112·5 secs.

The analyst remarked as a noteworthy fact that the recovered oil had a flash point so close to that of the original oil that the difference was negligible, whilst that of the unfiltered oil had undoubtedly been affected by light oil contamination, which could be entirely removed by the stream-line process of vacuum filtration. The filtered oil obtained by the process was quite a good lubricant and promised to give as good service in use as the original oil.



SECTION.



PLAN WITH TOP PLATE & COVER REMOVED.

FIG. 1.—CROSS SECTION OF STREAM-LINE FILTER.

Figs. 5 and 6 are photographs of two electric light bulbs immersed respectively in dirty and in filtered oil, showing the brilliant clarity of the latter.

The Marine Oil Filter

Fig. 7 shows a drawing of the marine type of oil filter. The filter is steam-heated and is complete with its own electrically driven vacuum pumps. The filtered oil passes through the sheets in extremely fine streams and is subject to a vacuum of 25 inches and a temperature of 180°–200° F. so that every trace of moisture is evaporated. The steam so formed is drawn off by a special vacuum pump, the oil being drawn out of the container by a separator pump and returned to the engine supply.

The filter may be cleaned by the manipulation of a single control lever which operates a combination cock. The latter in the centre position permits the oil in the body of the filter to drain back to the tank and at the same time causes the first vacuum pump previously mentioned to compress air into a container. Moving the valve cover to the *clean* position discharges the compressed air through the filter and blows off the accumulated deposit into a sludge tank. Returning the lever to the working position puts the filter in action again. The filter needs no attention beyond the manipulation of this cock, which will occupy less than ten minutes for every eight hours the filter is in use.

Fig. 8 shows a filter for cleaning dirty dry-cleaning spirit. The filter is similar to the oil filter, with the exception that the filtration is effected by pressure instead of by vacuum.

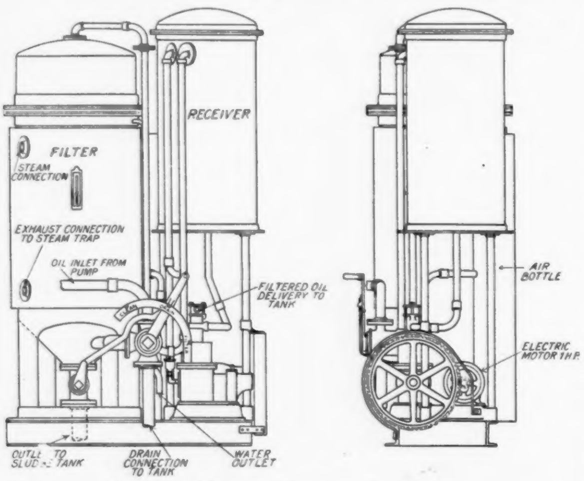


FIG. 7.—MARINE TYPE OF OIL FILTER.

When the rate of filtration falls below a predetermined point, the operation of the necessary valves for cleaning the filter is effected by means of a simple automatic contrivance.

New Automatic Rotary Type

Figs. 9 and 10 show a newer development of the stream-line filter for those purposes where a large amount of solid must be dealt with and where it is desired to recover the solid in as dry a form as possible. In this case the filtering medium takes the form of a flat sheet arranged in a star shaped framework. The liquid is drawn through the sheets by vacuum. The framework is rotated by means of a Geneva cam. The cake is first loosened by compressed air and then removed by the scraper as seen in Fig. 10. The action of the Geneva cam causes the star framework to remain stationary while the scraper moves to and fro along the packs and then, when the scraper is at the end of its travel, rotates the framework to its next position. A rotary distributing valve is arranged so that the filtrate is drawn off into a vacuum receiver and that compressed air is applied at the necessary point. Washing of the cake can be provided for where necessary.

A New Oil Separator

A DEMONSTRATION took place on Thursday, January 21, at Shirley, Surrey, of a new apparatus, the H. and H. dehydrator, for separating oil from water. The apparatus is a compact tank and an installation for dealing with ten tons an hour costs £180. The water, after separation, is said to be tasteless and to contain less than one-thousandth of one per cent. of oil. It works on a gravitation principle and is understood to have useful applications in the margarine industry.

Prospects for 1926 Trade

Sir Max Muspratt's Comments on Coal Commission

SIR MAX MUSPRATT, speaking as president at the annual meeting of Widnes Chamber of Commerce last week said that the year 1925 was undoubtedly a very disappointing one, and 1926 was far more promising. But they could not expect real success unless they faced every one of the issues that were likely to come before them. The cost of commodities, he said, was only about 50 per cent. above pre-war, and the cost of living was something like 75 per cent. He thought that both industrialists and retailers had to find out what were the causes of the differences between 50 per cent. and 75 per cent., and to see if there were not economies to be effected somewhere. There were three matters on the bad side of our situation. The question of unemployment, the question of the crushing taxation and the possibilities of relief were not very promising, and the extraordinary increase in the difference between imports and exports. The difference was getting rather alarming, and although there were no signs that it was doing us much harm it was a distinct source of anxiety. It was, however, an undoubted fact that the spending power of the people was greater than it had ever been before in the history of this country. It conveyed to his mind that their industrial life and their life altogether had altered, and that they could not be satisfied with all the old explanations of the past. They wanted to realise that they were living in a different world, under different conditions, full of promise if only they were able to turn that promise into practical effect.

Our Coal Consumption Reduced

Proceeding, Sir Max said that no one could omit to deal with the very serious position in the coal industry, because if that came to a very serious crisis all the signs of improvement, all the reasons for hope of improvement would go by the board, and they would be thrown back for three or four years. He would like to have seen the mine-owners and miners recognise some absolutely fundamental facts which had led to that position, because if he in any way sized the position up both sides were asking for the impossible. The total likely consumption of coal in this country had been, to his mind, permanently reduced. Because science and practice had taught them not to waste coal to anything like the same extent that they did when the price was 5s. or 6s. a ton. These economies had faced the coal industry with the fact that they had too many men working and too many miners wanting to work. He had great hopes that the Commission, probably one of the ablest Commissions that had ever been brought together in this country, would find out some solution by which the inefficient mines could be scrapped with compensation and that the surplus miners could be absorbed in some fashion. The compensation should not, of course, be such that the nation could not possibly bear. The nation had got to help the nation, and if only the owners and the miners would face facts he saw no reason why the efficient mines should not be prosperous in the future; or why the miners for whom there was bona-fide work should not get back to at least their relative position as wage-earners that they had before the war or even better.

Sir Max, expressing thanks at his re-election as President of the Chamber, said that frankly he was proud at his nomination as president of the F.B.I. This year was going to be a difficult one but the encouragement he had received gave him heart to face it.

Royal Technical College

THE Journal of the Royal Technical College (Glasgow), No. 2, December, 1925, contains the following papers of chemical interest: "Production of Hydrogen by Steam in a hot Boiler Tube," by J. Porter; "Presence of Air in Pure and in Alkaline Water," by J. Porter; "Pseudo-Alums," by R. M. Caven and T. C. Mitchell; "Additions to our Knowledge of Azoxy Compounds," W. M. Cumming and G. S. Ferrier; "Reactions of Semicarbazides," by I. V. Hopper; "Some Acyl Derivatives of Hydrazine," F. J. Wilson, A. B. Crawford, and E. C. Pickering; "Separation of the Components of Petroleum," P. F. Gordon, D. Baird, and T. G. Hunter; "Crystalline Structure of Metals," by J. H. Andrew; "Specific Volume Determinations of Carbon and Chromium Steels," by J. H. Andrew, M. S. Fisher, and J. M. Robertson.

The Evolution of Colloid Mills

By Dr. S. P. Schotz

In this article the author, who has spent some time in the study of colloid mills, summarises their chief characteristics and describes briefly six well-known types. The order in which the various machines are discussed is for convenience only, and no comparative treatment has been attempted.

It is he nature of man to resist innovations that throw out of gear daily routine and create new conditions. This applies still more to industry, with its keen competition, its struggle to satisfy the demands of customers and simultaneously to secure a reasonable profit. In consequence, manufacturers exercise great caution in adopting novel machines and ideas, however promising. In the face of such circumstances, colloid mills have made great progress, although the first colloid mill proper has only been on the market for about five years. Even though the original great hopes may not yet have materialised, so many uses are being found that the development of these appliances will continue to proceed in a normal manner. It is a great credit to Great Britain that—contrary to the wailings of pessimists—our manufacturers have shown the greatest enterprise in taking up and developing these machines. Britain probably owns more colloid mills than the rest of the world combined.

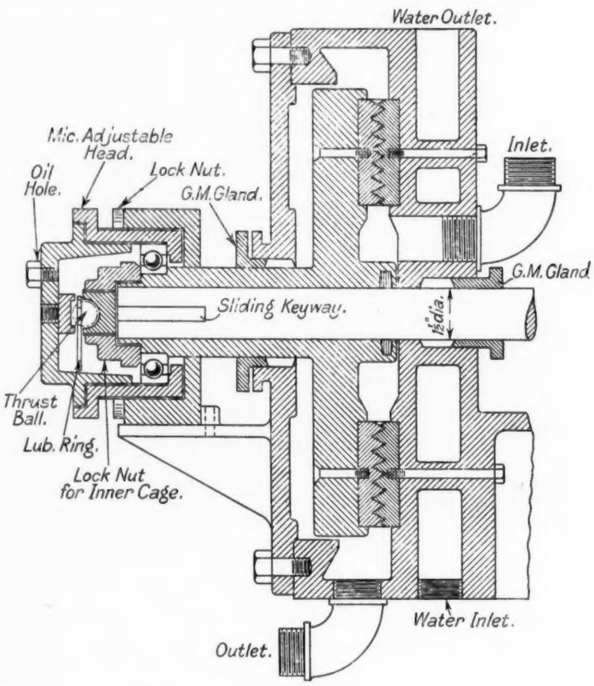


Fig. 1.—The Carter Emulsifier.

Nearly all colloid mills are British-made, and even the most brilliant colloid mill ventures abroad were engineered by British finance and technical ability.

The essential characteristic of the action of colloid mills is high speed in a fluid medium. In consequence, the grinding action does not depend to such an extent on closeness of contact as it does in all other fine-grinding machinery. The film of liquid, which coats all the working parts of the machine, could be considered at the high speed as a solid mass, and particles of the material which are suspended in the liquid film behave, at the high speeds developed, as if they were embedded in something solid. Therefore, the grinding effect of these machines increases with the speed of rotation. Shearing, beating, rubbing, trituration, mechanical and hydraulic crushing all play an essential part in the action of these machines, the importance of any one of these effects being more in one type than in another.

The colloid mills at present in use in Great Britain are mainly of the following types :

Disc Mills.—The Carter Emulsifier, by J. Harrison Carter, Ltd. ; the Circulator Mill, by Follows and Bate, Ltd.

Cone and Cylinder Mills.—The Premier Mill, by Burt, Boulton and Haywood, Ltd. ; the Hurrell Homogeniser, by Sun Lane Engineering Works.

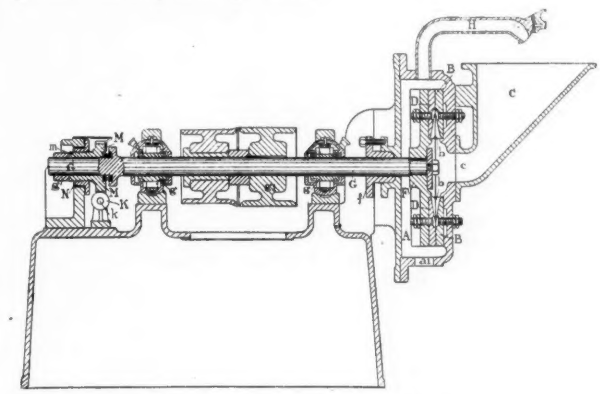


Fig. 2.—The Circulator Mill.

Beater Mills.—The Plauson (or Plauson-Block Mill), by the Plauson Mill and Filter Press, Ltd.

Combined Disc and Beater Mills.—The Kek, by the Chemical Engineering Co., Ltd.

Disc Mills: Carter and Follows-and-Bate Types

Stone disc mills are probably the most ancient mechanical mills employed, and it is a curious verification of an old adage, that several representatives of colloid mills—the youngest branch of grinding machinery—are disc mills. The grinding mechanism of the Carter Emulsifier and the Follows and Bate Circulator Mill consists of a pair of suitably encased vertical discs, one of which is driven (rotor) and the other stationary (stator). In the Carter Emulsifier the discs are provided with a number of concentric triangular ridges which are slotted tangentially by square grooves leading from the centre to the periphery. The Circulator Mill is provided with one pair of flat discs and another pair of discs covered with grooves and recesses intersected by smooth rings. In the Circulator Mill the axis of the rotor passes through the casing and the fixed disc ; the distance between the discs is altered by moving the axle of the rotor by a suitable mechanism. In the Carter machine the fixed disc can be screwed in and out of the casing, thus allowing alteration of distance. Details are shown in the accompanying illustrations.

In both classes of mills the introduction of materials is in or near the centre, and is aided by the centrifugal force,

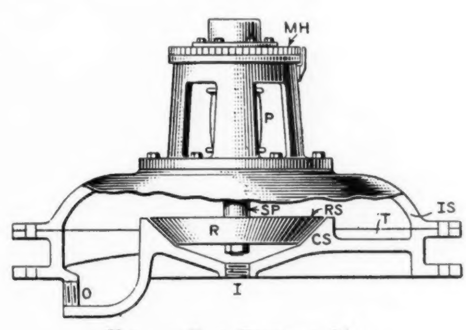


Fig. 3.—The Premier Mill.

which sucks at the central opening of the discs and flings the mass towards the periphery. In the Carter Emulsifier the feeding is assisted by the gripping action of the tangential slots, while in the Circulator Mill the distance between the discs is widest at the centres in order to facilitate the entering of coarser particles. The Circulator Mill is provided with an

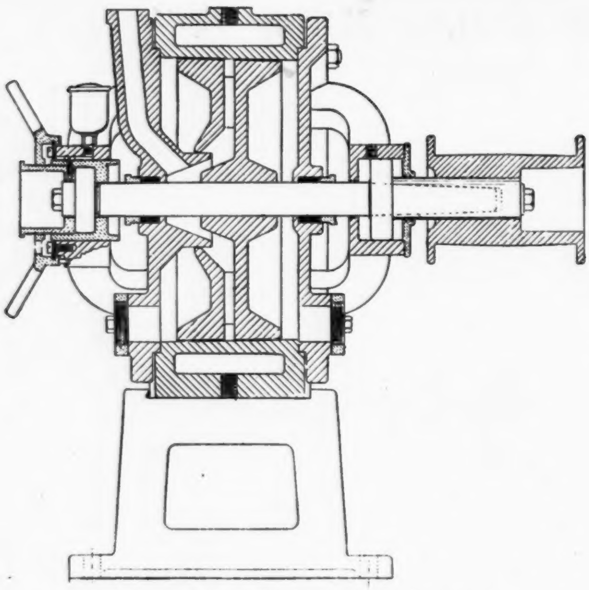


Fig. 4.—The Hurrell Homogeniser.

arrangement for the automatic circulation* of the fluid, which takes place through the impelling action of the revolving surface.

The Premier Mill

Stripped of all its refinements, the Premier Mill consists of two horizontal truncated cones of the same pitch, one of which (generally the top cone) rotates inside and close to the other, as shown below, so that the construction of the grinding surfaces is quite similar to the old cone mill.

The inside cone or rotor is keyed to a vertical shaft which passes through suitable bearings, the latter being adjustable in such a manner that the rotor can be brought within convenient distance of the working elements. The working surfaces are smooth. The mechanism is enclosed in a casing provided with openings at the top and bottom. In most cases the coarse material is fed from below with the aid of a " head " of material and assisted by the centrifugal sucking action developed. The discharge takes place through the top.

The Hurrell Homogeniser

The Hurrell Homogeniser consists in the main of two concentric truncated cones or cylinders, one running inside the other, a narrow clearance being left between the rotating and fixed parts. The machine is provided with two end covers. The rotor or movable part is constructed similar to a solid pulley or like two half-length pulleys fixed web to web so that ducts are left between them. The ducts extend from the periphery to the receiving groove into which the supply pipe projects (see illustration).

The quantity of material discharged should, therefore, be equal in each direction, any end-thrust on the shaft bearings being eliminated. The products are received in the annular recesses at the end covers and leave by the discharge.

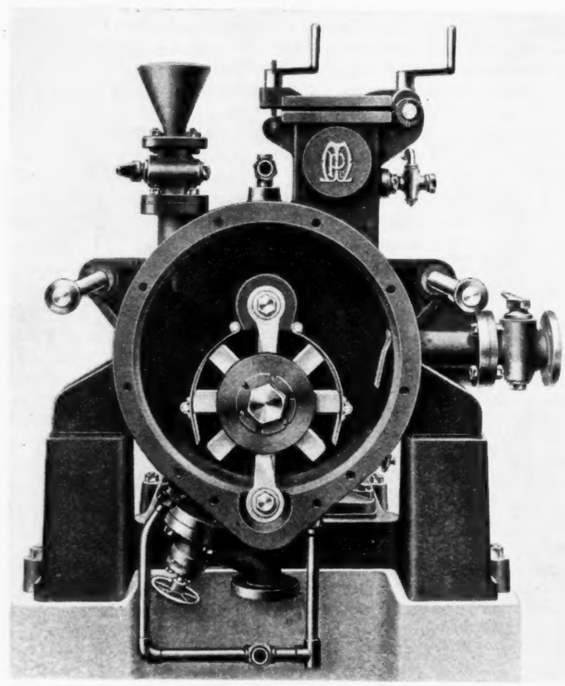


Fig. 5.—The Plauson Mill.

The Plauson (or Plauson-Block) Mill

The Plauson Mill consists of an oval casing with a circular cavity closed by means of a front cover. A series of fashioned steel plates (beaters) are keyed on to an eccentric axle (rotor). When the axle rotates, the beaters pass between and close to a number of stationary plates (anvils-stators) fixed at the top and bottom of the machines. One or two baffles are provided for impeding the motion of the liquid inside the machine. There are inlets at the top and outlets at the bottom and side, some types being provided with an arrangement for automatic circulation. The distance between the beaters and anvils varies from 0 to 2½ mm. and cannot be readily altered.

The Kek Mill

The Kek Mill mainly consists of a horizontal rotating disc (rotor), provided with a number of studs, which runs coaxially against a superimposed stationary disc (stator), similarly provided with studs and with or without concentric grooves. The inlet is through the centre of the stator and the discharge of the ground material takes place round the circumference. The pins are shaped like rivets and held in position with the aid of other plates, which are screwed to the rotor and stator (see illustration).

The distance between the discs is greatest at the centre and decreases towards the rim, thus facilitating feeding. The

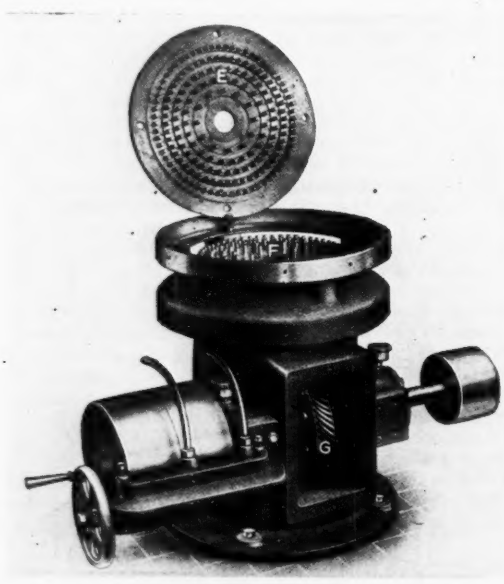


Fig. 6.—The Kek Mill.

* This function could probably be made part and parcel of every known colloid mill. It has been utilised on the small Plauson Mill, and the writer has found that it can also be applied to the Carter Emulsifier.

number of pins and their position varies according to the purpose of the machine. The grinding mechanism is surrounded by a casing inclined towards the bottom.

Details of Colloid Mills

Heating and Cooling.—All colloid mills can be provided with jackets, etc., for heating and cooling.

Bearings.—Most colloid mills are provided with ball-bearings, which appear gradually to displace roller bearings.

Speed.—To obtain with the aid of colloid mills particles of colloidal dimensions a peripheral velocity of not less than 40 metres per second is indicated. 1,000 to 12,000 revolutions per minute are recommended by various makers.

Horse-power Consumed.—This will depend on the peripheral speed, the output, the proportions of solids and liquids, the hardness of the solids, temperature, and addition of dispersing agents. Strictly, comparative experiments have so far not been carried out.

Chief Applications

The chief applications of colloid mills are at present the manufacture of emulsions and suspensions of every description. Oil emulsions previously prepared by prolonged boiling and stirring are much more readily produced by colloid mills. This class includes emulsions for spraying roads and mines, "creams" for textiles, tanning materials, disinfectants, insecticides, toilet preparations, essential oils, foodstuffs, homogenised milk, and others. Next in importance are enamels, distempers, pigments for wallpapers, dopes, printing inks, typewriting inks, artists' colours and paints, pencils and organic dyes, and carrying out or accelerating chemical reactions.

In the industry of cheap paints colloid mills have so far not made the progress that was originally anticipated, but this is more due to the excellence of the existing paint grinding mills and the organisation of the paint and varnish trade with which they have developed, rather than to any inherent faults of the colloid mills themselves. The application of colloid mills in industry is frequently surrounded by a good deal of secrecy, and rightly so. Manufacturers are justified in protecting the results of their enterprise and expenditure on experiments and research.

If I estimate the number of colloid mills at present in use in Great Britain at 600, probably this figure is on the low side. As the applications of these machines become more numerous, while the mills themselves become more perfect, within the next few years there may not be a chemical works in Great Britain without some type of colloid mill.

(For other articles on colloid mills by the same writer see THE CHEMICAL AGE, 1922, Vol. VI., p. 790, Vol. VII., p. 493.)

Fatal Fire at Paint Works

A FATAL FIRE occurred at the Homerton works of Lewis Berger and Sons, Ltd., paint, colour and varnish manufacturers, on Thursday, January 21. Wood, a labourer, was injured in an explosion in the enamel room and died later.

At the inquest at Hackney on Monday Mr. F. Palmer, a chemist in charge of the proxcelin department, said that nitro-guncotton was used. This was damped and thus there was no risk of an explosion. Asked by the Inspector of Factories for the names of chemicals used, Mr. Palmer wrote them down because he did not wish to disclose them as they were secret and not used by other firms. He admitted that there would be some vapour, but there was proper ventilation. The contents of the mixture would be drawn off and stored in a tank which was exposed at the top. The Inspector of Factories said that if solvents were thus stored they would give off fumes and could easily ignite. The witness agreed that this might happen if an electric spark came into contact with them. Evidence was given to show that no electrical defects were revealed. Mr. R. Walton, an L.C.C. inspector of petroleum and explosives, said that there was sulphur lying about and a lighted cigarette thrown down on it would form a bridge between the sulphur and the petroleum, the vapour of which would explode. He thought that the explosion took place inside the mixer. It was shown that the man was not smoking.

A verdict of accidental death was returned.

Water Sterilisation by Gaseous Chlorine

(FROM A CORRESPONDENT)

A PARTICULARLY interesting process now being developed on a huge scale is the continuous sterilisation of water by means of a measured trace of chlorine gas, generally not more than about one part per 2,000,000 being employed, although this depends to some extent on the constituents of the water (other than bacteria), which absorb nascent oxygen from the free hypochlorous acid due, of course, to the reaction between the chlorine and the water.

The principle is at present being adopted in four general processes, that is, the sterilisation of household water supply, the treatment of swimming bath water, the disinfection of sewage and sewage effluents, and the prevention of algoid and similar growths on the condenser tubes of steam engines and turbines, as well as other surfaces exposed to the continuous action of a large volume of water, such as, for example, cooling towers and the floors of condenser chambers. In this latter connection another striking new development is the prevention of the growth of mussels and other shell fish in the pipe circuits of power stations using sea or brackish water for cooling purposes, the action being that the chlorine kills off the minute organisms on which the shell fish live.

In this connection, the Paterson Engineering Co., Ltd., Windsor House, Kingsway, W.C.2, have just issued an interesting publication, "Water Sterilisation by Gaseous Chlorine," which deals with the whole question in a detailed and scientific manner, and certainly everyone interested should get a copy. The firm use for this purpose an apparatus called the "Chloronome," which is connected to a cylinder of liquid chlorine, and then, by means of suitable reducing and control valves and other similar gear, an exact measured trace can be added continuously to a small portion of the water and this dilute solution mixed with the main bulk, giving not only absolutely accurate control but also a quick mixing of the chlorine with every portion of the water, an important point.

It is stated that to-day over 1,000 million gallons of water is being treated per 24 hours in different countries with this apparatus and the application is growing rapidly.

A portion of this book more particularly interesting to chemists deals with the subject of the super-chlorination of water, subsequently followed by de-chlorination, using sulphurous acid gas, sodium sulphite, sodium bi-sulphite, or sodium thio-sulphate. This method is sometimes necessary for complete disinfection, such as, for example, where there is risk of epidemics.

Further, especially noteworthy is the reference to the use of Chloramine (NH_2Cl), which was discovered by Raschig in Germany in 1907, and was investigated specially from the sterilisation point of view by Dr. S. Rideal. The Paterson Engineering Co. state that they have solved certain technical problems in connection with the application of Chloramine. For certain waters high in oxygen absorption the method appears to be valuable, and the principle will result probably in a very great increased use of chlorine in place of the unstable hypochlorites.

Corrosion in Gasworks Plant

TAR wash oil is now known to be the cause of the corrosion of lead packings in benzole recovery installations. Hitherto this corrosion has been attributed to impurities such as sulphuretted hydrogen, cyanogen, and ammonia. At boiling temperature fresh wash oil is five times as corrosive as used wash oil. Another recent discovery is that water-free anthracene oil is about twice as corrosive as used wash oil, according to the *Manchester Guardian Commercial*. Neutral oils account for practically no corrosion. In plant for ammonia concentration, aluminium pipes and castings are reported to give better service than steel or cast iron, a durability of eighteen months being expected for oxy-acetylene welded aluminium parts, as compared with the six months' service of cast iron. Aluminium has been tried as a substitute for wood in the construction of grid condensers, but its economy is questionable, because the lightness combined with capillary features of wood have made the latter a more suitable material.

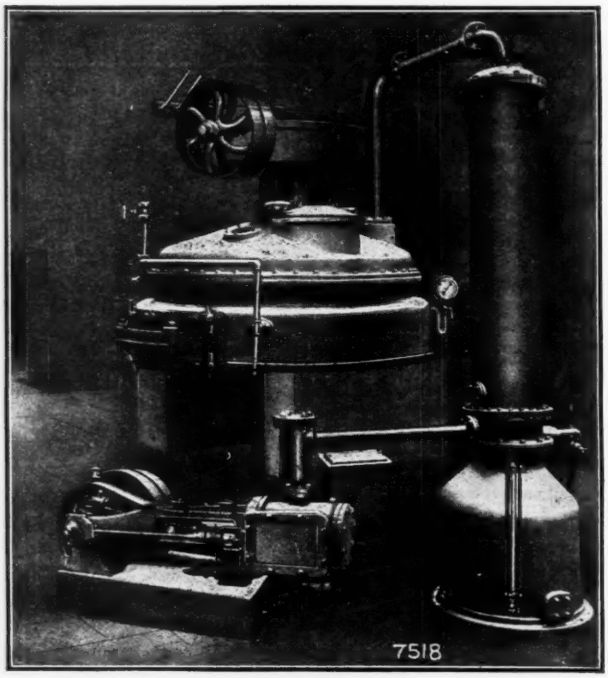
Tpyes of English Dryers

Their Application in Industry

Manlove, Alliott and Co., Ltd., are manufacturing a very important line of rotary dryers which may be arranged for heating either by furnace, gas or steam. The application of these machines is very wide indeed. While they may not be the cheapest type of dryer for a given output in the case of sulphate of ammonia, they possess great advantages in other respects, inasmuch as there is little or no abrasion of the crystals, and consequently there is not the same tendency for the dried salt to conglomerate into masses. This freedom from dust is very important, since it is essential that the dried sulphate should retain its free flowing qualities. Further, it is possible to carry out the process of neutralisation while the salt is passing through the drying machine. The heating of rotary dryers for sulphate of ammonia is sometimes accomplished by waste flue gases, sometimes by a special furnace or a gas heated air heater, and in other cases the drying medium is hot air provided by a steam heated air heater.

Drying of Beet Sugar

Another application is for the drying of beet sugar after it leaves the centrifugals, and Manlove, Alliott and Co., Ltd., have supplied a very large proportion of the new beet sugar factories in this country with their rotary dryers. In some cases coolers are supplied also. Machines of this type are also naturally in use in sugar refineries both here and abroad.



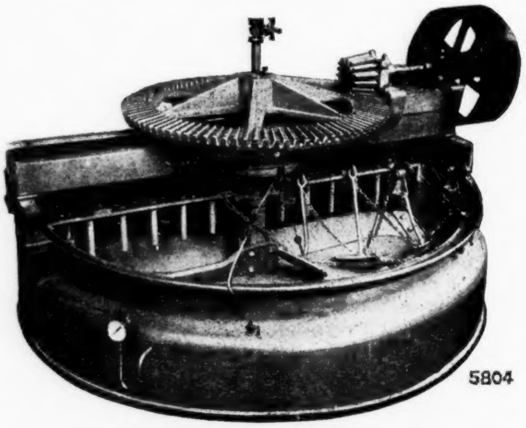
Vacuum Dryer—Johnstone Type.

Such sugar dryers are usually of the non-jacketed type, with steam heated air heater, but sometimes jacketed machines are supplied, or the machine may be arranged with an internal steam heated dryer.

The furnace heated rotary dryer has very wide application. When suitable precautions are taken, it may be employed for drying organic matter containing a high percentage of moisture. It also handles such substances as glass makers' sand, zinc concentrates and Broken Hill slimes, bauxite, and a large number of ores.

Crystals and Ores

The " Johnstone " machine differs from the above in that it is a batch dryer, and consists of a steam jacketed pan with a powerful agitating gear. It may be arranged either for atmospheric conditions or for vacuum. It treats such substances as blood, manures, crystals, and ores—in fact, a very wide range of substances where the type required is suitable. The pan may be loaded from 4 in. to 8 in. deep, according to its size, which could be 4, 6, or 8 ft. in diameter. The time for drying will vary from an hour in the case of some ores or crystals, to about 6 or 8 hours in the case of certain organic substances which give up their moisture with great reluctance.



Non-Vacuum Dryer—Johnstone Type.

The average power for the largest machine would usually range between 5 and 7 h.p. without the vacuum pump. The discharge may be arranged either in the bottom of the machine or at the side, as may be convenient.

The " Firman " dryer has very much the same type of duty as the " Johnstone " dryer, though its main application is the drying of fish and other manures, and cattle foods. It consists of a cylindrical jacketed dryer with internal beaters or paddles. The internal diameter is generally 4, 5, or 6 ft. and the length 13 ft. It may be arranged for vacuum or atmospheric conditions.

Modified Orsat Apparatus

A description of the modification of the Orsat apparatus used in the U. S. Bureau of Mines, Department of Commerce, for the analysis of gases is given in Technical Paper 320, just issued by the Bureau. Many modifications of the original Orsat apparatus for gas analysis are in use at present, each having its merits and being particularly adapted for some special line of work, the Bureau points out. The number and the kind of pipettes used depend on the composition of the gas to be analysed. If ethane is to be determined, in a complex gas mixture containing carbon monoxide, hydrogen, methane and ethane, a copper oxide tube is used for combustion of the hydrogen and carbon monoxide and the cuprous chloride pipettes may be omitted to advantage. If ethane is absent, as in producer and blast-furnace gases, two cuprous chloride pipettes may be used to absorb the carbon monoxide and the copper oxide tube may be omitted.

This paper describes the apparatus used in the Bureau of Mines gas laboratory at Pittsburgh, Pa., for the complete and partial analysis of gases. A complete analysis—including carbon dioxide, illuminants, oxygen, carbon monoxide, hydrogen, methane, and ethane—can be made without connecting or disconnecting any parts. Since all other constituents are removed before the paraffin hydrocarbons are burned, larger amounts of the paraffins may be often taken for combustion with oxygen, and more accurate determinations of methane and ethane can thus be obtained. The same argument holds true for hydrogen and carbon monoxide, which are determined by fractional combustion with copper oxide at 300° C. Either mercury or water may be used as the confining liquid in the burette, depending on the accuracy desired. Copies of Technical Paper 320, " The Bureau of Mines Orsat Apparatus for Gas Analysis," by A. C. Fieldner, G. W. Jones, and W. F. Holbrook, may be obtained from the Bureau of Mines, Department of Commerce, Washington.

X-Rays in Industry

Sir William Bragg Outlines its Applications

The Friday evening discourses at the Royal Institution were resumed on January 22, when Sir William Bragg spoke on "The Work of the Davy Faraday Research Laboratory."

Sir William briefly described the foundation of the laboratory by the late Dr. Ludwig Mond. It was open to research workers of any nationality—no fees or expenses for electricity, water, or gas were to be charged. Such a free and generous foundation was, he said, surely remarkable; and the members of the Royal Institution might well feel proud of it. The laboratory, he continued, was well adapted to team work, it provided room for some fifteen to twenty workers, and was actually employed in this manner and all its rooms were occupied. The main problem under attack was the application of the new X-ray methods to the study of organic substances. This covered a vast range of materials such as fats, oils, paraffins, alcohols, dyes, and explosives.

The new methods of analysis by X-rays were continually showing promise of useful applications to many industrial problems, but it was desirable that such laboratories as the Davy Faraday and the university laboratories should not allow themselves to be drawn away too far from the problems of pure research. If the latter were neglected the industrial application would in the end lose its vitality.

Some interesting discoveries had been made with respect to the chain-molecules, showing that in fats, greases, and other similar bodies, they arranged themselves in layers, with the chain perpendicular to the layers. It had recently been found possible to extend the earlier X-ray measurements of length and other dimensions to the study of modification of the simple chains. It was known that differences in their properties could be made by adding side links of various kinds and at various points on the chains, and that these were of profound importance in their behaviour. Recent extension of the X-ray methods had made it possible to weigh the additions and to determine their place, which would surely be of value in the interpretation of their significance in organic structures and elsewhere.

As to the oxygen atom, information of its behaviour in crystal structure was coming in from various sources. Further knowledge of the structure of quartz, into which oxygen entered largely, coupled with growing knowledge obtained at Manchester University and elsewhere, of the structures of ruby, chrysoberyl, and other compound oxides was helping to make clear its general behaviour.

Artificial Silk Developments

Professor Huebner's Observations

Important developments in the artificial silk industry were outlined on Friday, January 22, at Manchester, by Professor J. Huebner, of the College of Technology, who has just returned from a tour of the artificial silk industries on the Continent. He said they were only at the beginning of the industry, even in quality of production. He foresaw the creation of new material in the realm of artificial silk of a soft and attractive high-grade quality, almost like silk itself. The chief feature of this new product would be the elimination of the unattractive metallic lustre in the present artificial silk productions. The real future of the industry would be mixing in the spinning of real silk fibre with cotton or wool. This took away just enough of metallic lustre and strengthened the artificial silk.

He suggested that manicurists were likely to form part of the staff of big artificial silk factories. "Silk hands," he explained, "are necessary for silk work. You have them in plenty among the firms in places like Macclesfield, but as progress is made in these enterprises and new factories are required in different parts of the country, it is only to be expected that a great deal of attention will be given to improving the delicacy of touch and increasing the finger sensitiveness of the operatives. Grade 1 quality may very easily deteriorate into Grade 2 by the mere touch of rough fingers."

The International Paper Co., of Canada, has supplied bleached sulphite pulp for fibro silk for some time, but recent demands have necessitated plant extensions and, apart from the market in Europe and U.S.A., Courtaulds' factory at Cornwall, Ont., is now creating a Canadian market.

Arrangements have been completed for the purchase of Pilkington Brothers' Sutton glassworks for an artificial silk factory. The property has excellent water supply and natural reservoirs, and the project will probably employ 3,000 workers.

Mr. J. Ivan Spens, of Brown, Fleming and Murray, chartered accountants, London, has been elected to the board of Snia Viscosa. This is to conform with the agreement with Hambros Bank, who have purchased one million shares in the Snia concern. Mr. Spens investigated the accounts on behalf of the bank.

Professor Giorgio Mortara, according to Italian reports, says that the 1926 production of artificial silk should reach, and perhaps exceed, 100,000 tons. He foresees an increase in production with increased competition, unless this is checked by agreements. Asia is becoming a big importer.

Co-Partnership in Industry

Sir Alfred Mond's Views

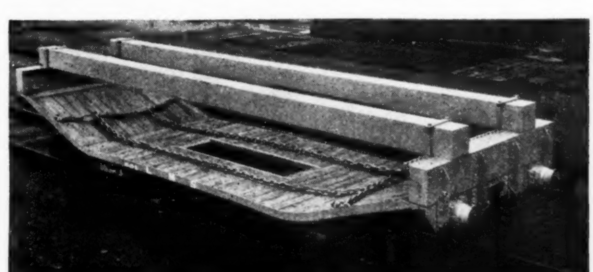
As announced in The Chemical Age last week, an urgent business conference at Brussels prevented Sir Alfred Mond from being present to inaugurate the conference of the Labour Co-Partnership Association which was opened at Newcastle on Saturday, January 23. However, he contributed an interesting paper, which was read on his behalf, in which he emphasised the need for a new psychology in industry, and advocated the principle of gain-sharing. The present coal position showed conclusively the immediate need of a new industrial psychology. No legislation, commissions, or reports could make a man cut more coal than he was prepared to cut, but if only a new spirit could be made to prevail in the industry it could be established once more as a paying proposition.

The gain-sharing scheme in operation at the Mond Nickel works had been very successful. The total credited to the workers exceeded 20 per cent. of their wages. The employee's bonus was invested in the company in his own name, so that in effect he became a cumulative participating preference shareholder. This and similar schemes made it undoubtedly clear that given a financial incentive workers would co-operate with the management in reducing working costs.

Sir Alfred, in the paper, declared that from conversations he had had with workers and their leaders, and with employers, he believed that the idea could be carried out with general acceptance. Thinking men in industry were becoming more and more convinced that this was the line of future development, and he suggested that the time had come when the principle should receive legislative sanction without involving any stereotyped method, but by calling upon industries to submit their proposals to the Board of Trade.

A 20-Ton Chemical Pan Wagon

The photograph below shows one of the eleven new 20-ton wagons constructed by the London Midland and Scottish Railway Co., at its Derby works for the conveyance of machinery, chemical pans, etc. These trucks are of steel construction with a timber floor fitted with a centre opening 7 ft. by 2 ft. wide to take the bottom of the pans. They measure 27 ft. over headstocks, with a 14 ft. length of well, and can be fitted with cross and longitudinal timber baulks. The wagons are fitted with independent hand brakes, and can operate on a $1\frac{1}{2}$ chain curve.



20-Ton Pan Wagon.

The Dependence of Industry on Chemical Science

Presidential Address by Dr. Levinstein

"Philosophy in the Market Place" was the picturesque title of a notable presidential address delivered to the Manchester Literary and Philosophical Society on Tuesday evening by Dr. Herbert Levinstein. The address, as will be seen from the extracts that follow, dealt with the indispensable part chemical science must play in the maintenance and development of our industries, and insisted, not only on the importance of laboratory research, but on the vital need of the right utilisation of its results and on the value of scientific knowledge as a qualification for high directional offices.

OUR main problem is the establishment under modern conditions of new industries based on scientific—especially chemical—discoveries.

(*a*) *Scientific discoveries are published to the world.*

Chemical discoveries, wherever made, are published and read at once by those interested in all countries. In other countries there are industrial groups ready to adapt any chemical discovery for industrial purposes. As regards the organic chemical industries, it would be folly to deny that the best foreign countries are stronger and better directed than our leading organisation. It does not follow that because an invention is made in England it will be exploited in England. The manufacture of methanol from water gas has been carried out only, as far as I know, in Germany, yet the invention is a French one. Naphthalene chemistry was largely worked out by Armstrong and Wynne ; the industrial harvest of this was chiefly reaped by the Bayer Co. J acid may have been first isolated here, but the profits on Brilliant Fast Scarlet 4 B's went to Elberfeld.

New Type of Industrialist Wanted

The Department of Scientific and Industrial Research is trying to bring the original minds of science into contact with industry, to bring the Philosopher into the Market Place. I fail to see any corresponding recognition that a very special type of industrialist is required to combine with the men of science, that a different type of market man is required. In other countries they are not so blind. We have few people in leading positions in industry with the vision that comes from knowledge to adopt a half worked out process, to solve its difficulties, and to create a world demand as did Dr. Mond with the Solvay process.

The careful examination of laboratory results is a matter for the heads of any business which maintains a high research department. An informed judgment in the selection of suitable substances for manufacture is necessary, not for the research department, but for the heads of the businesses. Look down the list of company directors of our big industrial organisations. How many of them have had a scientific training or can tell the difference between a feasible and a useless new process out of their own knowledge ? The inventive industries must be directed by men who understand science as well as business.

Right and Wrong Views of Research

(*b*) *Research organisations are not useful, except as a Service Department to large and competently managed undertakings.*

The reluctance of the ordinary average manufacturing concern in this country to employ a research staff is amply justified. In an average British concern such a department does not pay. Research is not for the average market man. There is nothing so expensive as employing a lot of chemists who either have not the knack of discovering things for you, or discover things that you have not got sufficient technical ability to work on a large scale, or for which you have not got sufficient discernment to find a market.

Organised industrial research can only be successfully carried out—and spasmodic research is of no real importance in competition with other nations—by great organisations. The expense is great. A large scientific staff is expensive ; much more is required for experimental work on the large or semi-large scale. There must be the ability to design plant for novel ends and money to erect factories. This presupposes an organisation directed by those with technical experience and a commercial knowledge. It presupposes, above all, a great sales department able to exploit invention in all the open markets of the world.

What does the inventor of a new laboratory reaction do if he has no such organisation behind him and if he is not backed by a large manufacturing concern able to assist in its technical development on the large scale ? He can sell his invention to those who have. What do you require for this technical development ? A staff of experienced technologists, a plant design section, a constructional engineering section. Your inventive chemist is generally a pure research chemist and has in my experience neither the knowledge nor the desire for large scale work. The qualities which make for success in these two branches are different and seldom combined in one person. It is extremely difficult to recognise a potentially commercially valuable process in a laboratory preparation. It is extremely expensive to adopt one which fails. Always you are on the horns of this dilemma.

Laboratory Invention and Industrial Process

What are the outstanding successes of recent years in the organic chemical industries ? The B.A.S.F. Indigo process, the Haber process, and Viscose artificial silk. They all illustrate the difference between the laboratory and the factory ; between the discovery of a reaction and the creation of an industry.

We are constantly told that a million pounds was spent on "research" before the Badische Anilin and Soda Fabrik Indigo process was worked out. Apparently some people believe this. How can £1,000,000 be spent on laboratory work of this kind ? Professor Heumann discovered the process in 1890 and offered it to the Badische Co., who, Dr. Ehrhardt tells me, took up the work in collaboration with Meister, Lucius and Brüning, with whom there was an agreement to collaborate in the indigo work. M.L.B. soon lost faith in the process and ceased to work it, but the Badische Co. went on, and immediately after the agreement with M.L.B. ended in 1897, seven years later, they put indigo made by the Heumann process on the market. Is any person prepared to call Professor Heumann the inventor of this process ? No. Professor Heumann is far more indebted to the Badische Co. for exploiting his discovery.

The Lesson from Synthetic Nitrogen

The fundamental facts with regard to the conversion of nitrogen and hydrogen into ammonia were known before the B.A.S.F. became interested in the technical solution of the fertiliser problem. The possible conversion by passing the mixed gases over a catalyst at a given pressure was known, and it was known that the yield increased with increased pressure. From the cost figures, it was clear that the process could not succeed commercially, for the amount of ammonia obtained by a single passage did not cover the cost of compression. Whether Professor Haber originally directed the attention of the Badische Co. to the ammonia synthesis I know not ; but it was Haber, so I am told by Dr. Ehrhardt, who pointed out to the Badische Co. that the cost aspect was completely different if the ammonia could be separated from the compressed gases without the pressure being released. In this case the gases could be sent repeatedly over the catalyst for the cost of one compression. This appealed to the B.A.S.F., and the process was accordingly worked out on the small scale by Haber with the able assistance of Le Rossignol, a Channel-Islander. Is any person bold enough to declare that there exists in this country any firm who would have adopted this idea, who could have developed it and overcome successfully the great technological difficulties subsequently involved ?

Such inventions change the economics of nations. They put whole countries out of cultivation. Where to-day are

the madder fields and the indigo plantations ? And this invention is already threatening, and is meant to threaten, the most important export of Chile. Incidentally, by enabling us to imprison the nitrogen that floats uselessly over our land, this process, now worked at Billingham by Brunner Mond and Co., is of great significance to us, for it should help us to increase the productivity of our soil from our own natural resources, one of the two main problems facing this country.

In the true sense of the word Haber is not the inventor of what is known as the Haber process. The B.A.S.F. really made the Haber process. Dr. Bosch played a great part in the development of Oppau. He is now—a curious thing for British ideas—the head of the German I.G.

The Story of Viscose

The story of Viscose has the same moral. Cross and Bevan first published their observations of the action of carbon bisulphide on alkali cellulose. They recognised that it was a suitable substance for making artificial silk filaments. Does anybody seriously call either or both of these gentlemen the inventors of Viscose artificial silk ? Those who have experience will tell you with emotion of the difference between manufacturing Viscose silk and discovering the Viscose reaction.

The development of this process is due to many : above all to the courage and perseverance and commercial ability of Courtaulds. In a way Tetley of Courtaulds was rash ; in a sense he gambled with this process, because at that time, unlike the Badische Co., Courtaulds did not possess the technological resources which made success in the case of the Badische Co. certain. In my opinion Courtaulds' venture in this difficult field was only justified by their success. No higher compliment can, I think, be paid to their ability, courage, and resourcefulness. Never were profits more legitimately earned.

Defensive Research : A Task for the D.I.S.R.

I am using the word " research " in the debased sense which it acquired during the war. In any organic chemical works the research department is largely an intelligence department.

Every well-organised research department must examine patents emanating from its competitors and all other likely patents that appear to have a bearing on their industry. These patents or patent applications must be examined immediately they appear. Sometimes the French specifications, sometimes the German applications, sometimes the English, come first. The German applications, before being granted, are available for inspection for a few weeks at the German Patent Office in Berlin. Applications thus publicly exhibited have satisfied the German patent examiner as to novelty. Unless opposition to the grant is made in the prescribed number of weeks they will automatically be granted.

Prompt Intelligence Service Essential

Clearly every dyestuff firm not resident in Berlin must have copies of these applications sent to them as soon as they are open for inspection. Possibly one would wish to oppose the grant. In any case, all German patent applications and all other national foreign patents should be examined in the laboratory. If, as sometimes happens, they are of technical merit, experiments are immediately set in progress to endeavour to discover something similar. In other words, if the patent is good, live chemical manufacturers in all countries will try to get round the patent or apply for licences. There is nothing in the least wrong in this. I am just emphasising my point that most industrial " research " work is defensive in character.

In any case, a quick, if only a preliminary, investigation of every foreign patent bearing on the industry is the most important service that an intelligence department can bring. The advantage of such a quick investigation is not only to suggest analogous lines of research before the value of the invention is recognised by others. Later on, if the products made under this patent come on the market, you can speedily identify them and they may well have a counter almost ready.

When a chemical product is once well established in the markets of the world, it will remain established until a new product offered by a competitor successfully attacks and maybe replaces it. I call this kind of work defensive research work, and industrially it is the more important kind of research work. The great proportion of chemists employed by industry in what we call research work are engaged, and must be engaged, in this kind of counter play. This work, so costly and so necessary, appears to be precisely the work which could be carried out by the Department.

Work for the Teddington Laboratory

It would be of great value to our industries and a great saving of effort if all this work could be centralised in the new laboratory at Teddington on behalf of the whole of our chemical industries. This would by no means involve a new principle. The Department for Overseas Trade acts analogously. It constitutes an intelligence branch for the exporter of British goods. Why should not the chemical laboratories at Teddington become the intelligence branch for the British chemical industry ?

I would like to see every foreign patent examined at Teddington immediately after publication and a preliminary report made at once. Speed is the essential thing. Most patents are worthless and could be so reported at once. It is useful even to know that a patent is worthless.

I can assure Sir Frank Heath, if the suggestion appeals to him, that many firms would be glad to subscribe to such a scheme. The cost to the Department should not be unduly heavy. This is the one direct service to the industrial community of chemists which the Department can render that does not and cannot injure any other British manufacturer.

The Teddington laboratories are starting work in high pressure reactions. The publication of experiments made, say, on the Haber process might quite easily be detrimental to the interests of a firm which had already worked out the particulars for itself. Prompt reporting on all foreign patents affecting the chemical industry can do no harm to any British company, only good. If British industrial chemists were free, or partly free, for defensive research, they will have more time for research and for carrying out their own original ideas.

The Case of Patart

I have already referred to the Patart method of converting water gas into methanol. There is every probability that on this principle coal will some day be turned with good yield into liquid fuel. There is no country to whom the development of this invention is more important than to our own. What happened ? Colonel Patart, a Frenchman, patented his process only in France. As soon as the French patents were published, the Badische Co. at once examined the process and quickly surrounded it with a network of patents of their own. Methanol has now been made by the B.A.S.F. on a large scale for some time. Does any firm, even to-day in any other country, produce methanol synthetically ? I am not aware of any. Does not this incident strengthen the case for doing this work at Teddington, for doing it thoroughly and doing it for all ?

I believe that the regular publication of such reports would in itself demonstrate to the business world the extreme importance of following up the technical and scientific literature of the day. Nobody could neglect the reports, and chemists capable of understanding them would show themselves indispensable in the direction of the undertakings to which they are attached. Then, indeed, we should be able to develop for the purpose of national industry the wealth of scientific talent which we fortunately possess.

A New Chemistry

It is clear that our new knowledge of the structure of atoms and of molecules will lead quickly to a closer understanding of chemical affinity. A new chemistry is visibly rising—to use Baly's phrase " a high energy chemistry "—which will enable us to comprehend ultimately something of the chemistry of the living cell. Just as the Kekulé benzene theory enabled the Germans to develop their organic chemical industries, so will the newer knowledge lead to the development of quite different industries. We see it already in the new fermentation and the catalytic processes already of great importance.

This much is sure : this new philosophy will not be kept out of the market place. But it is not sure which shall be predominantly the buyer nations in the market place and which shall be predominantly the seller nations of the new wares. On the answer to this question, the solution of which lies in our own hands, depends perhaps the destiny of the people of this island.

Dr. Maxted on High Pressures in Chemical Industry

A New Field for the Chemical Engineer

"THE Employment of High Pressures in Chemical Industry" was the subject of a paper read by Dr. E. B. MAXTED at a joint meeting of the Chemical Engineering Group and the Liverpool Section of the Society of Chemical Industry at Liverpool University on Friday, January 22. Professor W. H. Roberts, chairman of the Liverpool Section and Liverpool City Analyst, presided. A party of members who travelled specially from London inspected the Walker Engineering Laboratories of the University and the Electrical Engineering Department.

The CHAIRMAN said he thought it would be the unanimous wish of the Liverpool Section that their heartiest congratulations should be extended to Sir Max Muspratt upon his nomination to the position of President of the Federation of British Industries. The meeting recorded their approval, and the SECRETARY was instructed to send an appropriate communication to Sir Max.

Dr. Maxted's Paper

Dr. MAXTED, to whom a cordial reception was extended, said that the use of high pressures in chemical industry constituted a recently developed and highly effective means for the economic realisation of many reactions which either did not take place at all, or proceeded too slowly under ordinary conditions. While the commercial applicability of high pressures on the larger scale had been shown mainly in the course of the synthesis of ammonia as a pioneer reaction of this type, a number of other processes existed in which a high pressure was necessary in order to obtain a satisfactory yield of the product required. Pressure might be used for changing the reaction path, for increasing the reaction velocity, for influencing the condition of equilibrium, or for facilitating the heating or cooling of a gas or the exchange of heat between gases in counter current. By reason of their small bulk and high conductivity, compressed gases might be heated with an efficiency comparable with liquids. Reference was also made by Dr. Maxted to water as a poisoning agent in the reaction in the production of ammonia. The paper also included illustrated details of various portions of typical high pressure plants, and, in particular, descriptions were given of the construction of joints between vessels and their covers, of insulated and sliding joints, and of the methods of attachment of high pressure connections.

For the rest, the paper was mainly devoted to a description of technical pressure reactions. The synthesis of ammonia and its recent developments were discussed, following which attention was paid to the variation in the reaction between the oxides of carbon and hydrogen which might be induced by increasing the pressure. Dr. Maxted showed how, with certain catalysts—for instance, with copper containing zinc oxide—pure methyl alcohol might be produced by working at a high pressure, provided that iron compounds and the alkalis were absent. In the presence of iron containing potash, a complex mixture, known as synthol, was formed. This consisted of various alcohols, acids and other bodies.

A description was also given of the use of pressure in the manufacture of hydrogen, in catalytic hydrogenation—particularly for compounds which were only reducible with difficulty—and in the Bergius process for the formation of liquid products by the hydrogenation of coal.

In conclusion, the lecturer expressed the view that there must be many other cases in which pressure might be used to obtain products which were not formed to any degree at the ordinary pressure; and observed that, since the difficulties were largely mechanical, it was a relatively unexplored field, which should present considerable attraction to the chemical engineer.

Discussion

Mr. H. E. POTTS asked if Dr. Maxted did not think it would be possible to obtain desired reactions under ordinary temperatures, and without having recourse to the very high pressures mentioned.

Mr. C. S. GARLAND said that they were aware that one of the shortages of the future would be that of fuel, and the belief was generally held that alcohol would come to be used, but there could be no doubt that, in high pressure work, there were two opportunities offered to the world to continue the present civilisation by the use of liquid fuel. Dr. Maxted had mentioned the production of methyl alcohol and aldehyde, and the combination of the two. There was no doubt that they would replace the ordinary products, and he thought it was not too much to say that Dr. Maxted had opened up a new era.

Describing the paper as "very timely," Dr. W. B. DAVIDSON said that chemists and chemical engineers appeared to be very much afraid of high pressures. They had been told by a certain professor that it would be possible to supply a city like Liverpool with gas by means of a 6 in. main, so long as the gas was used by the proper methods. Personally, he had used pressures up to 50 or 60 tons per sq. in., or about eight thousand atmospheres. Speaking as a gas chemist and a gas engineer, he desired to say that we did not appear properly to appreciate the value of high pressures and gas furnaces. The effect of using the "low-high pressures" would be to treble results.

Dr. R. THOMAS said that the advantages of high pressures in purely gaseous reactions were more or less obvious. With regard to the old type of reaction, viz., the reaction between two liquids, one of which was volatile, he found that the only effect was that which could be accounted for by increased temperatures alone. It was extremely doubtful whether water, in the hydrolysis of glycerine, for instance, had any higher activity than could be accounted for by the higher temperature employed. This put an economic limit to the useful application of high pressure in such reactions. He had been interested to hear that a small trace of water was a catalyst poison in the synthesis of ammonia. Personally, he would have expected the reverse, although water acted as a poison in some reactions and as a catalyst in others.

Professor E. C. C. BALY alluded to the extraordinary readiness of ammonia to carry small traces of water and to the passing of oil through compressors. In examinations they found that the ammonia brought water, and they could not deal with it at all. He thought it would be found that the equilibrium between hydrogen and nitrogen would be altered. This, in his opinion, was the explanation, and that the reaction would be reduced in the presence of water. The water set up a higher activation, and that was the explanation of the poisoning of the catalyst.

The CHAIRMAN tendered the hearty thanks of the Liverpool Section to Dr. Maxted for having journeyed specially from London to read his paper.

Dr. Maxted's Reply

Dr. MAXTED, having returned thanks, briefly replied to various points. With respect to the possibility of obtaining reaction with ordinary temperatures, he said this much they did know, that there were reactions which took place better under ordinary temperatures, but the only way in which fresh work could be performed in that field would be by setting up a new series of operations. The era of high pressures had opened up a new field, and it had only been rendered possible by the work done during the past ten years. Concerning town gas, he had not gone into the question of using pressure at the other end, but the question concerning the cost of gas was a very simple matter. With regard to the question of hydrolysis, his point was that, in reference to water as a liquid, it might be the temperature that was necessary, and that the only way to get that was by raising the temperature. In his paper he had desired to point out the effect of water on ammonia to keep the poisons out. They found similarly that the poisoning action of water and of carbon monoxide was exactly the same. It was a very definite poison, and all water must be got out.

In reference to the opening up of a liquid air plant, difficulties had been met with, and the liquefaction column through which much air had passed was shut up. When all the gas had boiled off, there came a gas which emitted a peculiar smell. Some of this gas was collected by a chemist, who applied a light to it, and it went off. They thought they had discovered a new element of the atmosphere, but when they went further into the matter they found that the inflammable gas was

nothing more than a combination of oil and carbon which had been pumped in in quantities in the course of six months and had been given off as the result of the boiling up process. It illustrated Professor Baly's point that compressors did take oil through with them.

Paint and Varnish Research

Dr. Morgan on Technological Problems

Dr. H. Houlston Morgan (President of the Oil and Colour Chemists Association) read a paper on this subject at the meeting of the Royal Society of Arts, on Wednesday, January 20.

Sir Frank Baines (Director of Works, H.M. Office of Works), who presided, said that an important point to remember was the great proportion of the cost of labour to the cost of material. In the matter of research the first step in advancement was to recognise what one did not know.

Dr. Morgan, in the course of his paper, said that the total capital value of the paint and varnish manufacturers of Great Britain to-day was probably of the order of £15,000,000 and a very large number of industries were more or less dependent upon it. If paint, or similar protective coating, were not used on metals or wood there would be great loss owing to rust and decay. The old time craftsmanship and the recipe-worshipping manufacturer had failed to keep pace with the increasing demands made upon the industry for newer, cheaper and better products with the result that the industry as a whole was in a backward position. Though there had been distinct evidence during the past few years that modern scientific methods were becoming appreciated in the industry, it was to be feared that the natural British prejudice against "anything new" had delayed scientific development. In order that foreign competition might be adequately met, scientific research was as essential as advertising and sales organisation. A subscription of one farthing for every cwt. of paints and varnishes exported would provide £3,000 per annum for research.

In order to solve the many problems of paint and varnish technology, it was necessary to have complete knowledge of the properties of the raw materials and the precise bearing which each had on the economic value of the dried film. The most important of the raw materials was linseed oil. Chemists classified it as one of the drying oils, and its drying properties were said to be due to oxidation of unsaturated glycerides containing ethenoid linkages. This oxidation was probably only one of a series of changes which occurred during the setting of a linseed oil film. Attempts, therefore, to ascribe a chemical formula, or even a definite and universal composition, to a dried linseed oil film, were doomed to failure. These attempts had all been based on rearrangement of the acidic parts of the glycerides in the oil; the part played by the glyceryl radicle had been neglected. The rate of drying of linseed oil films, and the composition and properties of the resulting film were greatly affected by change of physical conditions and the presence of foreign substances.

In paints pigment and medium were interdependent. Much confusion had arisen through ignorance of the contribution of the medium to the properties of the dried paint film. Fading and other colour changes were frequently due to a change in the optical properties of the paint as a whole brought about by changes in the medium. Extraordinarily divergent views supported by little evidence existed regarding the utility and economic value of the various pigments. This was due to the following reasons :—

1. Neglect to consider the rôle of the medium.
2. Attempts to correlate the value of the pigment with its chemical composition only.
3. Ignorance of the influence of size of particles in the properties of a pigment.
4. Ignorance of the relationships between, and methods of measuring, the fundamental properties of a pigment, viz., size and shape of particles, oil absorption, staining power, opacity, colour.

Information regarding these fundamental principles was urgently required. It would enable the manufacturer to improve and maintain the quality of his products and to reduce the cost of production; it would enable the user to test his paints in a reasonable time and in a satisfactory manner. Dr. Morgan mentioned that the British Engineering Standards Association Committees had at last found it possible to draw up specifications for certain straight linseed oil paints, but not for the so-called gloss paints and enamels, because the necessary information was not available.

Among the other urgent problems mentioned by Dr. Morgan were the setting of paint films and the fixing of the relative proportions of linseed oil to dry pigment in a mixed paint so as to yield the most durable product. On the manufacturing side particular attention should be paid to fineness, purity and dryness of pigments, and to the relationship between pigment and medium, which would enable the former to be readily and permanently dispersed throughout the latter in order to produce a paint showing no tendency to flocculate, "fatten" or "cake." Some method of estimating the durability of a paint was required. In order to obtain the necessary data, a large number of exposure tests and chemical and physical examinations would have to be made.

Points Raised in Discussion

Mr. A. Selby Wood (President of the National Federation of Paint Manufacturers) said that Dr. Morgan had made an abundantly clear case in favour of manufacturers undertaking research. Only by the knowledge thus obtained could the British paint and varnish trade maintain its pre-war pre-eminence in the world's markets. In a very short while the amount of money necessary for the larger of the two research schemes considered by the Federation would be forthcoming.

Mr. C. A. Klein emphasised the necessity for attracting the best type of chemist to the industry. The views of Dr. Morgan regarding the change of colour of straight linseed oil paints appeared to be opposed to the American view. The correlation of laboratory tests and field tests must be begun immediately, and he appealed to manufacturers to find the necessary funds.

Mr. S. K. Thornley (Chairman of the Research Committee of the National Federation of Paint Manufacturers) said he regarded this paper as the finest piece of propaganda which the research scheme of the paint and varnish trade had yet had. Before long all manufacturers would be convinced of the advantages to everybody concerned of co-operative research.

Dr. J. J. Fox said the fundamental thing to get to know was whether it was possible for paints to be made better than they were and whether, assuming they were properly applied, they were going to be more durable. The Eastman Kodak people had placed the sum of five million dollars at the disposal of the Massachusetts Institute of Technology, and it was quite certain that some of that money would be used for paint and varnish research.

Mr. Noel Heaton referred to the early troubles, in the days of the old Paint and Varnish Society, of interesting manufacturers in the subject of research. If they were approached during times of brisk trade, they said they were too busy, and if they were approached when trade was bad they said they had no money. All the problems mentioned in the paper were of a character which must be dealt with by combined effort. Great stress must be laid on the importance of the durability of the medium in a paint. Only seldom was there trouble with the pigments. In a recent German patent it was proposed to moisten the pigment first with a volatile organic solvent and then to evaporate the solvent. There might be something in the idea of starting by mixing the pigment with a vehicle of low viscosity and subsequently incorporating a vehicle of high viscosity. The general idea was that the drier the pigment the better the dispersion, but the manager of one of the large ultramarine works in this country had told him that better results were obtained by leaving a certain percentage of moisture in the pigment. This seemed quite contrary to the usual theories.

The Chairman suggested that research should include investigation into the conditions under which the operatives had to work. The pathological effects of paints upon the workers must not be overlooked.

Dr. Morgan said that the present state with regard to research in industry was largely the result of the quiet and unobtrusive work of the old Paint and Varnish Society, which had slogged away steadily for many years without much appreciation.

"From College to Works": Another Notable Opinion

By A. Chaston Chapman, F.I.C., F.R.S.

We are glad to publish the following important communication received from Mr. A. Chaston Chapman on the difficulties attending the passage of the chemical student from his academical studies to the very different conditions of chemical factories and works.

To the Editor of THE CHEMICAL AGE.

SIR,—I have read with interest your editorial remarks headed "From College to Works." The subject is of the highest importance since it deals with one of the most difficult periods in the professional life of the young chemist, namely, that covering his transference from the academic laboratory to the chemical works or factory. For some time after the commencement of the war the columns of the technical and general press were inundated with letters and with articles bewailing the neglect of chemical science in this country, and deploring the want of appreciation of the services of chemists so often shown by manufacturers.

There can be no doubt that for these complaints there was ample justification, but there is happily much less at the present time. On the one hand, the war brought home to the nation, in a way that nothing else could have done, the fact that chemistry is one of the foundation stones on which national progress rests, and that its continued neglect could only lead to disaster and our complete overthrow by more progressive and far-seeing nations. On the other, our universities have striven to put their houses in order, and academic chemistry, which had for so long been divorced from the living chemistry of the factory, has now, owing to the enlightened attitude of many of our leading teachers, been vitalised by the introduction of a substantial element of actuality. As a result, a much larger proportion of young men who now leave our colleges are not merely ornamental graduates, but—so far as they have gone—well trained chemists in the fullest and best sense of the word.

Unhappily the shadow of the examination hangs over all, and does much to prevent the best use being made of the excellent raw material with which the universities and colleges have to deal. That, however, is a matter which has been discussed on innumerable occasions and for which no adequate solution has been, or seems likely to be, proposed. The real difficulty comes when the young graduated student puts his foot on the first rung of the ladder and enters the factory or works; and it is here that so many fail. This, I think, is due quite as often to a misunderstanding on the part of the young man as to any deficiency in his scientific training, for he not infrequently fails to realise that he has still much to learn, and that a great deal of his further technical training, even in cases where an additional post-graduate year has been devoted to it at the university, will have to be done at the expense of his employer.

I would like to be allowed to quote from a presidential address which I delivered to the Society of Public Analysts and other Analytical Chemists in February, 1916, for the views I then expressed apply, though perhaps with somewhat less force, to the conditions existing to-day :—

> The young chemist seeking a position should remember that his future lies very largely in his own hands. The chemical manufacturer is not a philanthropist, neither is he a fool. Whilst he is obviously disinclined to pay a big salary or to make a binding agreement until he knows something of the capabilities of the man he is engaging, he will be equally anxious not to lose that man's services should he prove himself thoroughly capable and useful.
>
> Again, the manufacturer on his side must understand that in engaging the services of a young chemist from one of our universities he is getting the partly-manufactured material, and not the finished product. He should be told that his future employee is merely a well-trained apprentice who knows how to use the tools of his craft, but who will have to be given time in which to find his feet and to learn something of the new conditions under which he will have to work. It is here that our university professors can do much to prevent misunderstanding and disappointment by pointing out to manufacturers the limitations of the men whom they may be recommending.
>
> A good many manufacturers (I am not, of course, referring to the heads of large concerns where many chemists are employed, and where their functions are thoroughly well understood and appreciated) do not always know very clearly what they want. They have a vague idea that some sort of chemical assistance is necessary in a modern factory, and they consequently go to one of our colleges and state that they want "a chemist." As one of the objects of our colleges is very properly to find employment for the men they have trained, he is offered the services of a man who has perhaps just finished his chemical course, but who knows little or nothing of the nature of industrial chemistry or the requirements of the factory. He has done his work industriously and well, and perhaps with distinction, and his professor is obviously justified on general grounds in recommending him highly.
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> It is at this point, however, that the trouble to which I have alluded commences, for the young man in question is offered to the manufacturer labelled "chemist" without any qualification at all. As a very general rule no intimation is given to the manufacturer that his prospective employee is little more than a senior student, and, in the absence of any statement to the contrary, there is some justification for regarding him as thoroughly competent not only to carry out the routine work of the factory, but also to undertake industrial research, to cheapen production, and to effect improvements in the manufacturing processes concerned. At the end of the year, in many cases, nothing very definite has resulted, no additional profit has been made, and there is no obvious improvement in the factory working, and the manufacturer is very apt to give emphatic expression to his disappointment and to inveigh against science in general and chemistry in particular.
>
> I need scarcely say that I do not overlook the very numerous cases in which young chemists fresh from our college laboratories have entered factories and have most thoroughly justified themselves in every possible way, nor do I desire to exaggerate in the slightest degree the extent of the difficulty to which I have referred. I have merely called attention to a state of affairs which does, unhappily, exist, and which, owing to its unfortunate consequences, is one for which the chemical profession should urgently seek a remedy.
>
> I wish it to be understood, moreover, that my remarks apply especially to the general works chemists, to whom is entrusted the testing of the raw materials and finished products, and the exercise of a general scientific supervision. With the more important question of industrial chemical research it is quite impossible to deal within the limits of a Presidential Address. I would only say that chemists competent to initiate and to carry through to a successful issue the kind of investigations which are of importance to manufacturers are, comparatively speaking, few in number, and that the chemical investigator, like the poet, must be born. He may be shaped, but he certainly cannot be made, and it would save not a little disappointment if it were recognised more generally on the industrial side that men possessing all the special qualities of intellect and of character which go to make a successful chemical investigator are not very frequently combined in any one man, and that the chances of obtaining the services of such a man in a more or less haphazard way, and at a salary which would be rejected with scorn by many an artisan, are not very great.

During the past 25 years more than two hundred young men have passed through my laboratory, either as students needing some special instruction or as assistants, and in addition I have come into close contact with some hundreds of others in works and factories. Many of them in the earlier years, and most of them more recently, came from our universities and colleges after graduation, and I have had the opportunity of watching their start and in many cases of following their careers. I think, therefore, that I may claim to speak with some little knowledge and experience of the subject. The material turned out by our universities is after all the raw material of the manufacturer, and if only this fact were fully realised by both sides there would be fewer disappointments and failures.

With Sir William Pope I am in entire agreement when he says that the soundest training for the industrial chemist is one in which technological questions are ignored until the student has acquired a complete mastery of the great principles underlying modern chemistry. Nothing worth building can be erected without a solid foundation, but the ever-increasing demands of the various degree examinations and the multiplication of highly specialised degrees do not, I imagine, make the laying of this foundation any the easier.

My apology for writing so long a letter must be the great interest I have taken in this subject for a good many years and my own long experience in connection with industrial chemistry.—Yours, etc.,

A. CHASTON CHAPMAN.

Chemical Laboratories, 8, Duke Street, E.C.3.

January 26, 1926.

High Pressure Joints

To the Editor of THE CHEMICAL AGE.

SIR,—I am interested in your leader on "High Pressure Joints" in the number of THE CHEMICAL AGE just to hand. We have taught in our chemical engineering courses for many years that the most efficient joints for pressure are obtained with the minimum surface of contact in round joints and in others line contact. This is impossible, but the nearer the approach to these conditions the tighter the joint. It entails for metal to metal contact the employment of material having the highest elastic properties and the highest yield points, unaffected by such heat conditions as may be encountered. It is for this reason that high nickel alloys and pure nickel itself have superseded to a large extent the bronzes of an earlier period for high pressure and superheated steam.

As a pioneer in this direction I thought it might be of interest to you to know that the difficulty had been recognised and in some directions the problem solved. The elasticity condition in all cases where pressures on the surface, as in valves, fluctuates, is of the first importance.—Yours, etc.,

E. L. RHEAD.

College of Technology, Manchester.

"Synthetic Shellac"

An Interesting Note on Dr. Bellart

WITH reference to a paragraph in THE CHEMICAL AGE of January 16, announcing the production of a cheap synthetic shellac, said to be the invention of the late Professor Bellart, of Leeds, some additional particulars have been supplied to us by Mr. S. Robinson (Crown Chemical Co.), Dewsbury.

"Dr. Jean Bellart," he states, "was not a Belgian but a Swiss. I have seen his discharge from the Swiss Army. Bellart spent the greater part of his life in Germany. When he first came to this country he was employed by Read Holliday, Ltd., Huddersfield, long before the war. The reason for his leaving Huddersfield was that he was advised to, as many thought him a German, but the police knew this was not so.

"The writer came in touch with Dr. Bellart shortly after the outbreak of war at Mr. A. Davis's varnish works, Hope Mills, Water Lane, Leeds, where he sold several processes for manufacturing purposes. The writer was the first man to put the question before Bellart respecting varnish manufacture, for which I had spent personally several years experimenting for Mr. A. Davis. Dr. Bellart achieved the object in 1916.

"A personal friend of mine, Mr. J. Boyd, works manager for the late Marsh Jones and Cribb, of Leeds, used the first lot made, for which I have the panels at home, and it is far superior to varnish made from orange or T.N. shellac. Marsh Jones and Cribb, of Leeds, would have bought the recipe from Dr. Bellart, but Mr. Cribb sold out and died shortly after. The writer has made large quantites of this product and spent all his time with Dr. Bellart in the laboratory during his experimental work—same with the other products. I have made tons of this on a commercial basis for my old friend Dr. Bellart."

Research on Scale Formation in Boilers

THE purpose of an investigation being conducted at the Pittsburgh, Pa., experiment station of the U.S. Bureau of Mines, Department of Commerce, is to determine whether the character of the precipitates forming in boilers may be made to assume a form in which they do not attach themselves to the walls; and if the material in the boiler wall exercises any influence. Data have been obtained on the noncondensible gases which are carried off in the steam, and the correct relationships to be maintained when carbonate becomes unstable and phosphate must be used in boiler water conditioning. The use of phosphate may form objectionable deposits. This condition is being looked into. Further, indicators used in titrating boiler waters do not necessarily represent the true phosphate or carbonate concentration. Means of controlling this indication are being investigated. Conditions which may bear on wet steam are being watched in the hope that definite information may be acquired on the factors influential in wet steam development and thereby control be obtained over them.

Iron Carbonyl as an "Anti-Knock"

Recent Developments in Germany

IN THE CHEMICAL AGE of September 12, 1925, reference was made to the fact that the Badische Anilin und Soda Co. were proposing the use of iron carbonyl, $Fe(CO)_5$, as an "anti-knocking" substance, for addition to motor fuels. It is interesting to recall that the carbonyl was discovered in 1891 by Ludwig Mond and his collaborators, working in this country. It is a yellow liquid of b.p. 103°, and the products of its combustion, carbon dioxide and oxide of iron, both harmless, are blown out of the engine with the combustion gases. According to the German periodical *Umschau* (December 19, 1925) tests carried out over a period of two years have indicated that the carbonyl does not exercise any bad effect on the engine. As little as 0·2 per cent. of it in petrol prevents knocking, and the Badische Co. are putting various preparations of it on the market under the trade marks "Motyl" and "Motalin."

The preparation and use of iron carbonyl normally involves a number of difficulties and dangers, and the manner in which these have been overcome by the Badische Co. is discussed by Dr. J. H. Frydlender in *La Revue des Produits Chimiques* (January 15, 1926). The preparation of the carbonyl in quantity, which has previously proved impossible, is effected by the Badische Co. by passing carbon monoxide, or mixtures rich in it, such as water gas, over finely divided reduced iron at 180° C. and under a pressure of 100–150 atmospheres, the carbonyl being removed from the outflowing gases by cooling and condensation. The formation of the carbonyl may be accelerated by the addition of various catalysts, both solid and gaseous, *e.g.*, finely divided aluminium, bismuth or nickel, to the iron, and traces of water or mercury vapour to the carbon monoxide. Pure iron carbonyl is spontaneously inflammable, toxic, and sensitive to light. The danger of fire may be very materially lessened by addition of hydrocarbons or their derivatives (halides, alcohols), which apparently also greatly lower the toxicity. The sensitiveness to light of the carbonyl may be obviated by addition of 0·001–0·1 per cent. of various protective agents, *e.g.*, certain organic colouring matters, rubber, etc., to its petrol solution.

In view of the difficulties which have arisen with regard to the use of lead tetraethyl, further information will be awaited with interest.

Artificial Wool Developments

THE claims made for artificial wool continue to arouse marked interest.

Sir Edwin Stockton is reported to have said that he finds little difference between artificial wool and cheap artificial silk. The new product is dutiable and unless this "wool" were cheaper than cotton the latter would be preferred for durability.

The exact site of the factory for producing "Sniafil" has not been settled, according to Signor R. Gualino, president of the Snia concern. The new and enlarged factory at Turin will allow the present daily output to be increased from 15,000 lb. to 100,000 lb. The Snia company intend to produce only the raw materials.

Signor Gualino considers that artificial wool will produce fabrics at half the price of an equivalent natural material. It is also claimed that artificial wool yarn has a 5 per cent. greater tensile strength.

The Snia concern now owns, or controls, in Italy three modern factories (near Turin and Milan) working the viscose process. A fourth (near Turin) should commence production about March. Besides other textile plant they control sulphur mines and caustic soda plant, engineering workshops and exceptional transport facilities. Over 20,000 employees are largely accommodated in dwellings belonging to the company. The Societé Anonyme Fabrique de Soie Artificielle de Tomaszow, Warsaw, is controlled by "Snia Viscosa."

German experts are said to be sceptical of the Italian claims, but are increasing production of artificial wool fibre, especially at the Koeln-Rottweil concern, where the Vistrat thread is the leading product. Australian firms are ordering large samples of the new "wool."

The first important shipment of "Sniafil" from the Italian Snia Viscosa concern reached America recently.

From Week to Week

Mr. R. Jenkinson, of Swinton, near Rotherham, has been appointed metallurgist to Holman Brothers, Ltd., Camborne.

L. B. Holliday and Co., Ltd., of Huddersfield, have appointed P. N. Soden and Co., of Montreal, as their sole importers for Canada and Newfoundland, as from January 1.

Mr. Francis Russell, son of Sir E. J. Russell, director of the Rothamsted Experimental Station, died on Thursday, January 21, as the result of a collision with a motor while cycling at Harpenden.

A carbon monoxide detector so sensitive that it will record the gas in a puff of smoke from a cigarette is reported to have been perfected by the U.S. Bureau of Mines after three years' research.

A lecture on "The Organic Chemistry of Everyday Life" was given last week at Dunfermline Public Library by Dr. J. Read, Professor of Chemistry and director of the Chemistry Research Laboratory at the United College, University of St. Andrews.

An explosion occurred in the "corning" house of the powder works of Curtis and Harvey, at Faversham, on Wednesday. The cakes of explosives were being broken into powder, and the two workmen were killed instantaneously. The building was wrecked.

The reopening is announced of the chemical works which were built at Hassmersheim, Germany, in 1917, by the Badische Anilin und Sodafabrik, and afterwards closed in accordance with the Peace Treaty. The new Farbenindustrie (Dye Trust) are reopening it.

No alcohol will be allowed as fuel in this year's Tourist Trophy, the world's premier motor-cycling event. Previously the Auto-Cycle Union had decided to continue to permit the use of alcohol, while the Motor Cycle Manufacturers' Union were opposed to the use of all except the normal commercial fuels. This latter view was confirmed at a joint meeting of the Unions on Friday, January 22.

Kuttroff, Pickhardt and Co., of New York, discontinued the importation and sale of dyestuffs on January 1, 1926, the stock and business being transferred to the General Dyestuff Corporation, of which Dr. Herman Metz is the head. This completes the unification of the German Dye Kartel sales representation in the United States in the hands of the General Dyestuffs Corporation. Sale of fertiliser specialities and chemicals by Kuttroff, Pickhardt will be continued unchanged.

That tetraethyl lead in petrol is not dangerous to public health is the finding of a committee appointed by Surgeon-General Cumming of the U.S. Public Health Service. Over 250 individuals were exposed to the exhaust fumes of the gas and they also handled and distributed petrol containing tetraethyl lead. No case of lead poisoning or other disease was discovered. The committee found, however, a considerable danger in the manufacture and blending of the tetraethyl lead and that strict regulations were necessary in this connection.

Sir Alfred Mond has notified Lord Oxford and Asquith that he must sever his lifelong connection with the Liberal party. He finds that he differs on fundamental principles and he mentions Mr. Lloyd George's land policy. He prefers, he said, "to be an open opponent than an internal dissentient." Sir Alfred, who is a Privy Councillor, was first elected as Liberal member for Chester in 1906, and is now representing Carmarthenshire. He is to join the Conservative party. Sir Alfred's son, Mr. Henry Mond, has also given official notification that he is joining the Conservative party.

Considerable disputes were experienced at the extraordinary general meeting of the Egyptian Salt and Soda Co., Ltd., held at Alexandria recently. The meeting was requisitioned by certain shareholders who proposed to carry resolutions authorising the fusion of the other principal oil companies with the Egyptian company, prices to be agreed on annual oil production figures. After much argument and ineffective resolutions it was decided to hold a ballot on February 8. The measures to be voted on provide for the proposed amalgamations and for an increase of capital to an amount not exceeding £1,000,000 by the creation of 500,000 additional ordinary shares of £1 each, and a limit is fixed for the scheme of £850,000.

University intelligence includes the following announcements.—*Oxford:* Mr. F. C. Whalen (St. John's) to an extension of £50 for physics. On Tuesday a decree was carried by which a special allowance of £200 a year is made to each professor who is head of a science department because of the responsibility involved. Each professor would renounce his right to a portion of the fees from students in his department. The principle had been adopted in some cases at Cambridge. *London:* The following degrees have been conferred: D.Sc. in Chemistry on Mr. E. de Barry Barnett (internal student of University College) and Mr. H. Phillips (internal student of Battersea Polytechnic) and D.Sc. in Physics on Mr. E. P. Metcalfe (internal student of University College). *Manchester:* Mr. G. N. Burkhardt, M.Sc., Ph.D., Asst. Lecturer in Chemistry, is to be Lecturer as from September next.

The sulphuric acid plant of the Mond Nickel Co. at Coniston, Ont., which, as announced in The Chemical Age of November 28, had then commenced operations, will have a total production of about 25,000 tons.

A gift of £50,000 has been made to the American Petroleum Institute by Mr. Hiram Halle, president of the Universal Oil Products Co., of Chicago. It will be used to establish scholarships in various countries for research on petroleum.

The Faraday Medal has been awarded by the Institution of Electrical Engineers to Colonel R. E. B. Crompton, honorary member. He has been twice president of the Institution and has played a prominent part in developing electrical supply in this country.

The officers for 1926 of the British Section of the Society of Leather Trade Chemists are—President, S. Hirst; vice-president, H. G. Bennett; honorary treasurer, D. Burton; honorary secretary, J. R. Blockey; members of committee, W. R. Atkin and J. A. S. Morrison.

The Perkin Medal was presented to Dr. R. B. Moore, late director of the U.S.A. Bureau of Mines, at a recent meeting of the American Section of the Society of Chemical Industry in New York. The presentation was made by Dr. W. H. Nichols, and an account of "Moore and His Work" was given by Mr. S. C. Lind.

A sugar refinery is to be established in Ireland by a syndicate with a capital of £400,000. According to Prague reports the Credit Anstalt and the Vienna Laenderbank are responsible for the enterprise and will transfer their shares to the Czecho-Slovak Sugar Refineries in which they are financially interested. The machinery will be imported from Czecho-Slovakia.

To increase the supply of calcium carbide in the Soviet Union, which at present totals less than half the requirements, the Chief Chemical Committee, according to Moscow reports, has decided that the Makeyevski works belonging to the Yugostal are to be reopened on May 1. Production will be small at first, but the question of full running of the works will be considered later. Other producers are to be asked to increase their output.

A subsidiary company in conjunction with British, and possibly American, financiers, is understood to be the object of a visit of the director of the Electrolytic Zinc, who is to visit London shortly. The chairman of directors, with London and American financiers, has just visited Tasmania and conferred with the Premier, who urged the company to extend its operations, particularly in the direction of an extensive development of the West Coast ore reserves.

Dr. F. G. Cottrell has been awarded the gold medal for 1924 of the Mining and Metallurgical Society of America in recognition of "distinguished service in the development of a method of electrical precipitation of solid and liquid particles from smelter smoke and in recognition of his public spirit in making a gift of the proceeds of his invention for the support of scientific research." Dr. Cottrell is at present director of the Fixed Nitrogen Research Laboratory of the U.S. Department of Agriculture in Washington.

Arsenic in apples was the subject of yet another case, at Marylebone Police Court on Friday, January 22. Hampstead Council summoned two fruiterers for selling apples containing one thirty-fifth to one-thirtieth of a grain per lb. It was stated that an analyst had found that washing did not remove the arsenic as it was in the form of arsenate of lead and peeling did not completely remove the danger. The apples were imported from America, and while these summonses were dismissed on payment of costs, it was intimated that fines would probably be imposed in future.

The pass list of the January Examinations of the Institute of Chemistry for the Associateship in General Chemistry is as follows:—Adams, F.W., School of the Pharmaceutical Society and Chelsea Polytechnic Institute; Balmforth, L., trained under G. E. Johnson, F.I.C., at the Municipal Technical College, Hull; Blood, J. W., University College, Nottingham; Riley, T., The University, Liverpool; Shipman, G. E., trained under G. E. Johnson, B.Sc., F.I.C., at the Municipal Technical College, Hull; Walton T., Municipal Technical School, Blackburn; Winterbottom, E., The University, Manchester.

The British neglect of science was criticised by Lord Emmott' speaking at a luncheon of the Yorkshire Section of the Textile Institute on Monday. We were imitators rather than pioneers, he said. The artificial silk industry was an example, and in chemicals and dyes we were far behind Germany. We were late in the field as regards new industries and he connected that fact with our neglect of science. We had too much rule of thumb, and he thought Lancashire and Yorkshire manufacturers had had "almost a contempt of science, simply because they themselves possessed the qualities which made for success in the absence of science."

Obituary

Alderman John Harrison, twice President of the Pharmaceutical Society of Great Britain, at Sunderland, on Friday, January 22, aged 82.

References to Current Literature

British

ANALYSIS.—The accuracy of graduated measuring vessels. Part II. H. V. Renn. *Ind. Chem.*, January, 1926, pp. 30–34.
The determination of alcohol and ethyl chloride in chloroform. C. Newcomb. *Analyst*, January, 1926, pp. 19–30.
Measuring the smoke pollution of city air. J. S. Owens. *Analyst*, January, 1926, pp. 2–18.

ELECTRO-CHEMISTRY.—The electrical conductivities of hydrogen chloride and potassium chloride in water and acetone-water mixtures. T. K. Brownson and F. M. Cray. *Chem. Soc. Trans.*, December, 1925, pp. 2923–2935.
An electrometric and a phase rule study of some basic salts of copper. H. T. S. Britton. *Chem. Soc. Trans.*, December, 1925, pp. 2796–2807.

HYDRIDES.—Lead dihydride and lead tetrahydride. E. J. Weeks. *Chem. Soc. Trans.*, December, 1925, pp. 2845–2846.
The reliability of vacuum analysis for solid metallic hydrides. E. J. Weeks. *Chem. News*, January 8, 1926, pp. 17–18.

MENTHONE.—Researches in the methone series. Part I. J. Read and A. M. R. Cook. *Chem. Soc. Trans.*, December, 1925, pp. 2782–2788.

OPTICALLY ACTIVE COMPOUNDS.—The relationship between the optical rotatory powers and the relative configurations of optically active compounds. Part II. The relative configurations of the optically active mandelic acids and β-phenyl-lactic acids. G. W. Clough. *Chem. Soc. Trans.*, December, 1925, pp. 2808–2813.

SOLUBILITY.—The salting-out effect. The influence of electrolytes on the solubility of iodine in water. J. S. Carter. *Chem. Soc. Trans.*, December, 1925, pp. 2861–2866.

SPECTROSCOPY.—The influence of different nuclei on the absorption spectra of substances. J. E. Purvis. *Chem. Soc. Trans.*, December, 1925, pp. 2771–2776.
X-rays in industry. G. W. C. Kaye. *Nature*, January, 23, 1926, pp. 123–126.

SUGAR.—Beet sugar manufacture. *Ind. Chem.*, January, 1926, pp. 21–29.

THIONYL CHLORIDE.—Thionyl chloride. Part II. C. A. Silberrad. *J.S.C.I.*, January 22, 1926, pp. 55–57.

United States

ANALYSIS.—Rapid detection of small amounts of aluminium in certain non-ferrous materials. G. E. F. Lundell and H. B. Knowles. *J. Ind. Eng. Chem.*, January, 1926, pp. 60–61.
Laboratory distillation analysis of petroleum. H. G. Vesper. *J. Ind. Eng. Chem.*, January, 1926, pp. 64–67.

CATALYSIS.—The catalytic decomposition of hydrogen peroxide in a bromine-bromide solution. Part III. R. S. Livingston. *J. Amer. Chem. Soc.*, January, 1926, pp. 53–58.
Catalysis by silver ion of the oxidation of chromic salts by peroxysulphuric acid. The existence of trivalent silver compounds. D. M. Yost. *J. Amer. Chem. Soc.*, January, 1926, pp. 152–164.

FOODSTUFFS.—Vitamins in canned foods. Part IV. Green peas. W. H. Eddy, E. F. Kohman and V. Carlsson. *J. Ind. Eng. Chem.*, January, 1926, pp. 85–89.
Effect of sulphur upon nitrogen content of legumes. J. R. Neller. *J. Ind. Eng. Chem.*, January, 1926, pp. 72–73.

ISOTOPES.—The separation of the element chlorine into isotopes. The light fraction. W. D. Harkins and F. A. Jenkins. *J. Amer. Chem. Soc.*, January, 1926, pp. 58–69.

OXIDATION.—The oxidation of *d*-glucose by air in calcium hydroxide solution. M. H. Power and F. W. Upson. *J. Amer. Chem. Soc.*, January, 1926, pp. 195–202.
The influence of phosphates on the oxidation of butyric acid with hydrogen peroxide. E. J. Witzemann. *J. Amer. Chem. Soc.*, January, 1926, pp. 202–208.

PHOTO-CHEMISTRY.—The photochemical oxidation of leuco bases. B. H. Carroll. *J. Phys. Chem.*, January, 1926, pp. 130–133.
Photo-sensitisation by optically-excited mercury atoms. The hydrogen-oxygen reaction. A. L. Marshall. *J. Phys. Chem.*, January, 1926, pp. 34–46.

SOLUBILITY.—Solubility relations of isomeric organic compounds. Part VI. Solubility of the nitroanilines in various liquids. A. R. Collett and J. Johnston. *J. Phys. Chem.*, January, 1926, pp. 70–82.

SPECTROSCOPY.—The effect of solvents on the absorption spectrum of a simple azo dye. W. R. Brode. *J. Phys. Chem.*, January, 1926, pp. 56–69.
The absorption spectrum and the photochemical decomposition of acetone. C. W. Porter and C. Iddings. *J. Amer. Chem. Soc.*, January, 1926, pp. 40–44.

French

ALCOHOLS.—Magnesium alcoholates and their application to the synthesis of alcohols. Part II. Attempts with isobutyl and isoamyl alcohols. A. Terrentieff. *Bull. Soc. Chim.*, December, 1925, pp. 1553–1557.
The preparation of alcohol by chemical methods. Part VI. E. Girod. *Rev. Chim. Ind.*, December, 1925, pp. 373–376.

CARBONYLS.—Iron carbonyl as an anti-detonant. J. H. Frydlender. *Rev. Prod. Chim.*, January 15, 1926, pp. 1–4.

ESTERS.—Cellulose acetate, its industrial uses. Part I. M. Deschiens. *Rev. Prod. Chim.*, January 15, 1926, pp. 5–8.

HYPOSULPHITE.—The manufacture of sodium hyposulphite. Part II. R. Hazard. *Rev. Chim. Ind.*, December, 1925, pp. 365–370.

OILS.—Hydroterpene and other products derived from pine oil. J. H. Frydlender. *Rev. Prod. Chim.*, December 31, 1925, pp. 829–835.

REACTIONS.—Quantitative study of the action of mercury salts on dialkylbarbituric acids. Part I. Phenylethyl-, diethyl- and butylethyl-derivatives. P. Fleury. *Bull. Soc. Chim.*, December, 1925, pp. 1656–1668.

REDUCTION.—The reduction of 2 : 5-diketo-piperazine. M. Gawriloff. *Bull. Soc. Chim.*, December, 1925, pp. 1651–1656.

German

ACIDS.—On γ-truxillic acid. R. Stoermer and F. Fretwurst. *Ber.*, December 30, 1925, pp. 2718–2725.

ANALYSIS.—The determination of perchlorate in Chile nitrate on the basis of its precipitation with methylene blue. K. A. Hofmann, F. Hartmann and U. Hofmann. *Ber.*, December 30, 1925, pp. 2748–2754.
Detection of titanium and uranium by a drop test. N. A. Tananaeff and G. A. Pantschenko. *Z. anorg. u. allg. Chem.*, January 14, 1926, pp. 163–166.

CHOLESTEROL.—Contribution to the knowledge of cholesterol. H. Fischer and A. Treibs. *Annalen*, January 20, 1926, pp. 241–259.

HYDRIDES.—Solid metal-hydrogen compounds. G. F. Hüttig. *Z. angew. Chem.*, January 21, 1926, pp. 67–75.

PYRROL DERIVATIVES.—Substituted pyrrol alcohols, pyrrol thioaldehyde and a pyrrylamine. H. Fischer and A. Stern. *Annalen*, January 20, 1926, pp. 229–241.

TEXTILES.—The importance of a definite control of atmospheric moisture in textile works. J. Obermiller. *Z. angew. Chem.*, January 14, 1926, pp. 46–51.

Miscellaneous

ANALYSIS.—The estimation of nitro-bodies by reduction with titanous chloride at room temperature. I. M. Kolthoff and C. Robinson. *Rec. Trav. Chim. Pays-Bas*, January, 1926, pp. 169–176.
The estimation and separation of rare earth metals from other metals. Part VI. L. Moser and E. Ritschel. *Monats. für Chem.*, November 23, 1925, pp. 9–22.

CELLULOSE.—The distillation of cellulose, wood and similar materials with hydrogen under pressure in the presence of catalysts. H. E. Fierz-David and M. Hannig. *Helv. Chim. Acta*, December, 1925, pp. 900–923.

PHENOLS.—Molecular compounds of phenols. Part VIII. G. Weissenberger, F. Schuster and R. Henke. *Monats. für Chem.*, November 23, 1925, pp. 47–56.
Brom- and bromnitro-ethers of pyrogallol. M. Kohn and S. Grün. *Monats. für Chem.*, November 23, 1925, pp. 75–90.

Patent Literature

The following information is prepared from published Patent Specifications and from the Illustrated Official Journal (Patents) by permission of the Controller to H.M. Stationery Office. Printed copies of full Patent Specifications accepted may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at 1s. each

Abstracts of Complete Specifications

244,645. STABLE BICARBONATE OF AMMONIA, MANUFACTURE AND PRODUCTION OF. J. Y. Johnson, London. From Badische Anilin and Soda Fabrik, Ludwigshafen-on-Rhine, Germany. Application date, May 21, 1925.

Ammonium bicarbonate produced by this process is of such stability that it can be stored and shipped without loss, and is thus a very useful fertiliser. It has been found that the high volatility of ammonium bicarbonate usually observed is not the property of the pure salt, but can be caused by comparatively small amounts of ammonium carbonate or carbamate, or various double or triple salts of bicarbonate, carbonate and carbamate which are usually present. In this invention, the pure bicarbonate is obtained by allowing it to crystallise from a hot solution while continuously introducing carbon dioxide, with or without ammonia insufficient to form bicarbonate. This result is not obtained if aqueous ammonia or ammonium carbonate solution is saturated with carbon dioxide while cooling, in which case double salts are obtained. In an example, carbon dioxide is passed into a 12–15 per cent. solution of aqueous ammonia without cooling, the solution reaching a temperature of about 50° C. Crystallisation then occurs, and the passage of carbon dioxide is continued while the temperature falls. The crystals are separated and dried in a revolving furnace by air at 80°–90° C. The bicarbonate has a more glass-like appearance than the usual product, and may be stored without loss for a time in which other ammonium bicarbonate would lose at least 50 per cent. The density and stability of the crystals may be further increased by adding to the bicarbonate solution before crystallisation substances which influence the surface tension, such as benzene, petrol, carbon tetrachloride, iron carbonyl, tar oils obtained from coal or lignite tar, ammonium sulphide and sugar, which increase the surface tension; also substances such as naphthalene sulphonic acids substituted in the nucleus by one or more propyl, isopropyl, butyl, or isobutyl radicles which may be obtained by acting with a propyl or butyl alcohol on naphthalene or on naphthalene sulphonic acid in the presence of sulphuric acid, these substances having the property of decreasing the surface tension. In the case of a fertiliser, tar oil is a very suitable addition for this purpose since any remaining traces are not detrimental, but if the ammonium bicarbonate is to be employed for a purpose such as baking powder, carbon tetrachloride or sugar may be added for this purpose.

244,830. ORGANIC COMPOUNDS, MANUFACTURE AND PRODUCTION OF. J. Y. Johnson, London. From Badische Anilin and Soda Fabrik, Ludwigshafen-on-Rhine, Germany. Application date, September 24, 1924.

It has been found that oxides of carbon can be hydrogenated catalytically at high temperature and pressure to obtain methanol, and higher alcohols which are oily liquids mainly non-miscible with water. Such compounds are obtained by the processes described in Specifications Nos. 227,147, 229,714, 237,030, and 238,319 (see THE CHEMICAL AGE, Vol. XII, p. 161, Vol. XII, p. 337, Vol. XIII, p. 201, and Vol. XIII, p. 306). In this invention, these liquids are converted into organic compounds of a still higher order by subjecting them to the action of alkaline, acid, or neutral condensing agents. The products obtained include motor fuels, solvents for cellulose esters, natural or artificial resins for lacquers, varnishes, or paints, detergents, etc.

In an example, the liquid hydrogenation product is partly distilled in vacuo, and the distillate distilled again at atmospheric pressure. The fraction boiling at 66°–72° C. is then boiled with concentrated hydrochloric acid under a reflux condenser. An oily layer is obtained, which is separated, washed with alkali, and steam distilled. The product boils at 140°–155° C., and resembles turpentine oil.

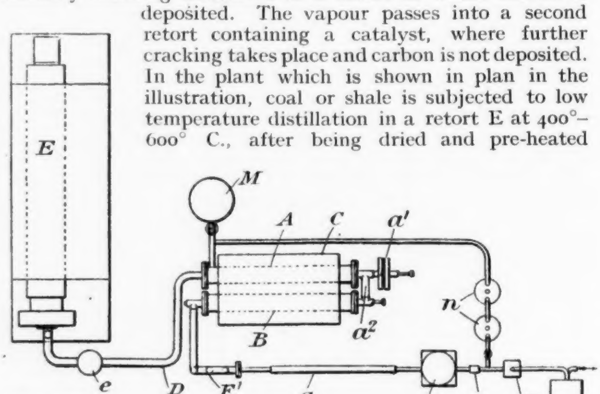
In another example, a mixture of the hydrogenation products boiling between 108°–250° C. is heated to 150°–180° C. with zinc chloride. The distillate is condensed, and separates into a watery and an oily layer. The latter is continuously returned to the still for 10–12 hours, and the oily substance finally obtained is distilled until the temperature is 260° C. An additional quantity of distillate is obtained by steam-distilling the residue. The distillate is treated with dilute caustic soda and fractionally distilled. The fraction distilling up to 200° C. is colourless, and is a good solvent for natural and artificial resins, and for nitrocellulose.

244,837. CARBONISATION OF FUEL, APPARATUS FOR. S. R. Illingworth, Brynfedwen, Radyr, Glamorganshire, The Illingworth Carbonization Co., Ltd., 16, Kennedy Street, Manchester, Robert Dempster and Sons, Ltd., Elland, Yorks, and H. J. Toogood, The Poplars, Elland, Yorks. Application date, September 25, 1924. Addition to 245,190.

The retort setting contains a row of vertical metal retorts, and tiers of horizontal thin walled tubes forming flues are arranged along each side of the retorts. Other similar flue tubes are arranged horizontally between the retorts at right angles to the first mentioned groups of flues. The cross flues are provided with ports, so that the gases can escape into the space surrounding the retorts. The retorts are thus heated by radiant heat from the tiers of horizontal flues, and by hot gases from the cross flues.

244,875. CRACKING AND SEPARATING MINERAL OILS. V. L. Oil Processes, Ltd., and O. D. Lucas, Vickers House, Broadway, Westminster, London. Application date, October 31, 1924.

The oil to be cracked is vaporised and subjected to preliminary cracking treatment in a retort in which carbon is deposited. The vapour passes into a second retort containing a catalyst, where further cracking takes place and carbon is not deposited. In the plant which is shown in plan in the illustration, coal or shale is subjected to low temperature distillation in a retort E at 400°–600° C., after being dried and pre-heated



244,875

to 200°–250° C. The vapour passes through a dust trap e and pipe D to the retort A, which is provided with an agitator driven by a pulley a^1. The vapour passes through pipe a^2 to the second cracking retort B, which is arranged in the same furnace chamber C, and contains catalysts such as described in Specification No. 209,355 (see THE CHEMICAL AGE, Vol. X, p. 173). The cracked vapour passes to an atmospheric condenser F where heavy oils are condensed, and then through water cooled condensers G, H. The vapour then passes to a pump J and oil scrubber K, and thence to a gas holder. Oil from another source M may be similarly treated in the same set of retorts, with or without the gas from the retort E. Some of the permanent gas can be returned through an ammonia saturator n. The retorts A, B are kept at about 500° C., and the condenser F at about 150° C. The condenser G is maintained at about 200° C.

244,895. CARBONYL COMPOUNDS, MANUFACTURE AND PRODUCTION OF. J. Y. Johnson, London. From Badische Anilin and Soda Fabrik, Ludwigshafen-on-Rhine, Germany. Application date, November 26, 1924.

In this invention the conditions necessary for the satisfactory manufacture of iron carbonyl on an industrial scale have

been discovered. Carbon monoxide or gas rich in carbon monoxide is passed over metallic iron which is obtained by reducing oxygen compounds of iron at moderate temperatures. The reaction is effected at about 50 atmospheres pressure or more, and a temperature of 100°–200° C. The gas must be passed over the iron at such a speed that deposition of iron carbonyl on the iron is prevented. The reaction gas contains 8 per cent. or less by volume of iron carbonyl, calculated as $Fe(CO)_5$. The iron carbonyl is preferably condensed by cooling under pressure, or by absorption in porous substances. The metallic iron is prepared from iron oxide, carbonate, or oxalate, or from roasted pyrites. In the latter case, roasted pyrites containing iron 60 per cent., sulphur 3·5 per cent., and copper 1 per cent., is freed from dust and charged into a pressure-resisting vessel lined with copper. The oxide is reduced in a current of hydrogen at ordinary pressure, and temperature rising to 500° C. The temperature is then reduced to 200° C., and carbon monoxide passed through at a pressure of 200 atmospheres and at such a rate that the reaction gas contains about 6 per cent. of iron carbonyl. The activity of the iron can be increased by adding finely divided oxide of aluminium, bismuth, or nickel, and the reaction is also facilitated by adding water or mercury vapour to the carbon monoxide. The speed of the gas must also be increased.

244,936. Dyeing Cellulose Acetate Products, Process of. L. B. Holliday and Co., Ltd., and A. Young, Deighton, Huddersfield. Application date, January 24, 1925.

These dyes are obtained by condensing 1-chlor-2 : 4-dinitrobenzene-6-sulphonic acid or 1-chlor-2 : 6-dinitrobenzene-4-sulphonic acid or their salts with substances containing one or more amino or hydroxy groups in equi-molecular proportions in the presence of sodium acetate. An example is given of the condensation of the potassium salt of 1-chlor-2 : 4-dinitrobenzene-6-sulphonic acid and aniline yielding 2 : 4-dinitro-6-sulphodiphenyl amine.

244,951. Chemical Product resulting from a Reaction between Barium and a Metal of the Sulphur Group, Manufacture of. C. Dickens, Key Route Inn, Oakland, Alameda Co., Cal., U.S.A. Application date, February 20, 1925.

This product is made by dissolving selenium or tellurium in an aqueous solution of barium sulphide. A concentrated solution is obtained which may be barium sulpho selenide or telluride. The product is suitable for treating woodwork, especially piles, to protect them from the attacks of insects, etc., and also as an insecticide for use on trees.

244,980. Abietic Acid, Process for the Purification of —and for Producing Pure Abietates or Abietic Acid. G. H. Dupont, 29, Rue Marceau Cauderan (Gironde), France. Application date, April 24, 1925.

In an example of this process, colophony is dissolved in alcohol and treated with strong hydrochloric acid and boiled. Soda is then added in sufficient quantity to neutralise the hydrochloric acid and one-fourth part of the abietic acid in solution. A precipitate of a salt of abietic acid is formed and is separated from the liquor by pressing. The precipitate may be treated with a strong acid to obtain a pure and nearly colourless abietic acid.

Note.—Abstracts of the following specifications which are now accepted, appeared in The Chemical Age when they became open to inspection under the International Convention :—227,084 (R. Cross), relating to materials for refining hydrocarbon oils, see Vol. XII, p. 232 ; 234,074 (B. E. F. Rhodin), relating to extraction and refining of magnesium, see Vol. XIII, p. 15 (Metallurgical Section) ; 234,138 (E. Merck), relating to preparation of hypophosphites, phosphites, and phosphoric acid, see Vol. XIII, p. 109 ; 242,296 (Farbenfabriken vorm. F. Bayer and Co.), relating to a new pharmaceutical compound, see Vol. XIV, p. 58.

International Specifications not yet Accepted

243,026. Benzanthronyl Nitriles. Kalle and Co. Akt.-Ges., 23, Rheinstrasse, Biebrich-on-Rhine, Germany. International Convention date, November 17, 1924.

Halogenated benzanthrones, *e.g.*, monobrombenzanthrone, are treated with cuprous cyanide with or without a high-boiling solvent to obtain benzanthronyl nitriles. These may be treated with caustic alkali or sodium amide to obtain vat dyes.

243,030. Solutions of Organic Substances. A. Eichengrün, 71, Bismarckstrasse, Charlottenburg, Berlin. International Convention date, November 17, 1924.

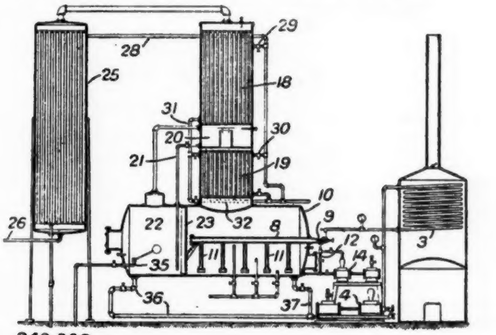
Methylene chloride with or without additions such as acetone, formic and acetic esters, benzene, triacetin, methyl alcohol, etc., is used as a solvent for fats, oils, mineral oils, rubber, resins, artificial resins, fatty acids and compounds, bituminous substances, alkaloids, cellulose esters, etc. Cellulose acetate soluble in acetone with or without cellulose acetate soluble in chloroform may be dissolved in methylene chloride and methyl alcohol. Solutions of cellulose acetate in other solvents may be made non-inflammable by adding methylene chloride.

243,031. Cellulose Acetate Compositions. A. Eichengrün, 71, Bismarckstrasse, Charlottenburg, Berlin. International Convention date, November 17, 1924.

Solutions of cellulose acetate made as described in 243,030 are quick-drying and non-inflammable and may be used as coating compositions for fabrics. The percentage of alcohol may vary from 5 to 45 per cent., but is preferably 20 per cent.

243,339. Cracking Hydrocarbons. J. F. Donnelly, Lemont, Ill., U.S.A. International Convention date, November 21, 1924.

Hydrocarbon oil is forced by a pump 4 through a heating coil 3 where it is heated to a cracking temperature under



243,339

pressure to prevent vaporisation. The oil then passes into an expansion chamber 8 and thence through depending outlets 11 to an outer vessel 10. Cooler oil from the base of the vessel 10 passes through a pipe 12 to mix with the heated oil on expansion. The cracked vapour passes through dephlegmating condensers 19, 18, to a condenser 25. Condensate from the upper condenser 18 passes through a pipe 21 to a chamber 22, and is mixed with fresh oil admitted through a valve 35, and the mixture passes through a pipe 36 and pump 4 to the coil 3. Cooling water passes through the condensers 25, 18, 19, the temperature being regulated by controlling the amount of water.

243,356. Alumina. E. L. Rinman, 14, Ymervagen, Djursholm, Sweden. International Convention date, November 22, 1924.

Aluminium sulphate is made from clay and then treated with alkali sulphydrate which precipitates crude alumina and ferrous sulphide, liberating sulphuretted hydrogen. The alumina is dissolved in alkali sulphide, yielding alkali aluminate and ferrous sulphide, and pure alumina is precipitated from the aluminate by sulphuretted hydrogen, with formation of alkali sulphydrate. In precipitating alumina from aluminium sulphate, the latter in hot concentrated solution is introduced into the sulphydrate in a mixer. More sulphuretted hydrogen is liberated than is required to precipitate alumina from the aluminate, and the surplus is converted into sulphur dioxide and then sulphuric acid. The alkali sulphate obtained in the process is reduced to sulphide for use again.

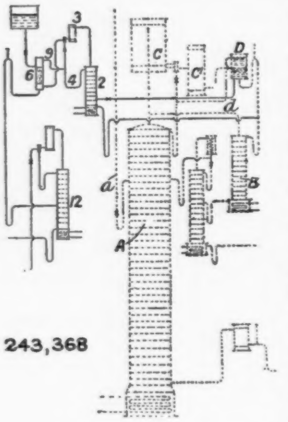
243,361. Organo-mercury Compounds. Farbenfabriken vorm. F. Bayer and Co., Leverkusen, near Cologne, Germany. International Convention date, November 21, 1924.

A solution of an organic mercury compound containing a protective colloid is precipitated with an organic solvent

miscible with water. Thus, the mercury compound of *o*-nitrophenol is dissolved in dilute caustic soda, mixed with an aqueous solution of albumose, neutralised with dilute acetic acid, and precipitated with acetone. Colloidal compounds soluble in water are obtained.

243,368. DEHYDRATING ALCOHOL. Distilleries des Deux-Sèvres, Melle, Deux-Sèvres, France. International Convention date, November 20, 1924.

Alcohol is distilled in presence of a liquid which yields an azeotropic mixture as described in Specification No. 214,581, and impurities such as acetaldehyde, ether, acetone, ethyl formate and methyl alcohol are removed. Alcohol is distilled in a column A, the plates of which contain the added liquid, and the vapour passes to a reflux condenser C and cooler C[1]. The condensate passes to the vessel D in which the greater part of the impurity settles out as a separate layer. This layer passes to a column 2, from which a binary mixture of vapours of the added liquid and methyl alcohol pass to a reflux condenser 3. Some of the condensate returns to the column, and some passes to a scrubber 6 in which it is washed with water. The upper layer of added liquid returns through a pipe 9 to the column 2. The mixture of methyl alcohol and water passes to a column 12 for separation.



243,368

LATEST NOTIFICATIONS.

246,110. Carbonisation processes. Farbenfabriken vorm. F. Bayer and Co. January 13, 1925.
246,126. Manufacture of condensation products of urea, or a derivative thereof, and formaldehyde. Soc. of Chemical Industry in Basle. January 17, 1925.
246,127. Process of converting into soluble form insoluble condensation products of urea, or a derivative thereof, and formaldehyde. Soc. of Chemical Industry in Basle. January 17, 1925.
246,128. Process for the production of phosphoric acid. I.G. Farbenindustrie Akt.-Ges. January 17, 1925.
246,142. Process of producing soluble salts of organic compounds of an acid character. Buchner, M. January 16, 1925.
246,155. Process for bleaching vegetable fibres. Chemische Fabrik Milch Akt.-Ges. and Lindner, Dr. K. January 14, 1925.
246,156. Manufacture of a new thioindoxyl derivative. Soc. of Chemical Industry in Basle. January 24, 1925.
246,181. Manufacture of preparations of diazo salts for dyeing and printing. I.G. Farbenindustrie Akt.-Ges. January 19, 1925.
246,183. Process of obtaining fast-coloured discharges on fast dyeings. I.G. Farbenindustrie Akt.-Ges. January 19, 1925.

Specifications Accepted with Date of Application

228,900. Amorphous finely-subdivided litharge, Process for the production of. T. Goldschmidt Akt.-Ges. February 8, 1924. Addition to 189,132.
229,330. Azo dyestuffs, Manufacture of. Farbenfabriken vorm. F. Bayer and Co. February 13, 1924.
230,082. Acridine compounds, Manufacture of. W. Carpmael (*Chemische Fabrik auf Actien (vorm. E. Schering)*). February 26, 1925.
231,150. Pharmaceutical products, Manufacture of. Farbenfabriken vorm. F. Bayer and Co. March 21, 1924.
232,620. Dyestuffs, Manufacture of. Soc. of Chemical Industry in Basle. April 20, 1924. Addition to 207,162.
234,086. Condensation products of the anthraquinone series, Manufacture of. Soc. of Chemical Industry in Basle. May 13, 1924. Addition to 205,525.
235,828. Brown coal or lignite, Process of obtaining liquids from M. Melamid. June 17, 1924.
237,872. Condensation products of the anthraquinone series, Manufacture of. Soc. of Chemical Industry in Basle. August 2, 1924. Addition to 205,525.
245,479. Alkali liquors, Treatment of. H. Harris. August 8, 1924.
245,486. Ingot iron and steel, Processes for the deoxidation of. W. Tafel. September 18, 1924.
245,499. Vertical retorts for use in the distillation of shale and like materials. R. H. Crozier. October 7, 1924.
245,540. Rubber latex compositions and the application thereof. T. M. Rigby. October 21, 1924.
245,553. Circuit reactions, Process and apparatus for carrying out—under very high pressure. J. Y. Johnson (*Badische Aniline and Soda Fabrik*). November 12, 1924.
245,575. Removal of sulphuretted hydrogen from gas, and apparatus therefor. Woodall-Duckham (1920), Ltd., E. W. Smith, and T. C. Finlayson. December 10, 1924.
245,584. Quinizarin, Manufacture and production of. H. Dodd, W. C. Sprent, and United Alkali Co., Ltd. December 29, 1924.
245,623. Vat dyestuffs, Manufacture of. O. Y. Imray, London (*Farbwerke vorm. Meister, Lucius and Brüning*). February 16, 1925.
245,633. Separation of lower-temperature tar into phenols and hydrocarbons, Process for. H. E. Potts (*Zeche Mathias Stinnes*). March 7, 1925.
245,674. Azo dyestuffs, Manufacture and production of. J. Y. Johnson (*Badische Anilin and Soda Fabrik*). July 13, 1925.
245,678. Dyestuff emulsions, Production of. C. E. J. Goedecke, Colloisil Colour Co., Ltd. April 9, 1925.
245,687. Solid urea from solutions, Production of. J. Y. Johnson (*Badische Anilin and Soda Fabrik*). August 14, 1925.
245,703. Phenolic condensation products, Manufacture of. H. Wade (*S. Karpen and Bros.*). October 23, 1925.

Applications for Patents

Bakelite Ges. Production of phenol-aldehyde resins. 1,928, 1,929. January 22. (Germany, January 27, 1925.)
British Celanese, Ltd., and Goldthorpe, W. O. Treatment of cellulose derivatives. 1,631. January 20.
Calvert, J. Filters for liquids. 1,484. January 19.
Chemische Fabrik Milch Akt.-Ges. and Lindner, K. Dyeing, etc., animal, etc. materials. 2,035. January 23. (Germany, January 23, 1925.)
Coley, H. E. Production of zinc white. 1,512. January 19.
Coley, H. E. Manufacture of metallic nitrides and ammonia from nitrogen. 1,753. January 21.
Coley, H. E. Manufacture of cyanides from nitrogen. 1,754. January 21.
Coley, H. E. Apparatus for manufacture of gas. 1,755. January 21.
Coley, H. E. Manufacture of alloys. 1,756. January 21.
Coley, H. E. Manufacture of zinc. 1,757. January 21.
Coley, H. E., and Kekwick, L. O. Production of hydrocarbons. 1,758. January 21.
Compagnie des Mines de Vicoigne, Noeux, et Drocourt. Low-temperature distillation of coal. 1,699. January 20. (France, July 17, 1925.)
Crusius, A. Baumgarten, Fakaltorf-Studien Ges. Breaking up cellulosic constituents in vegetable substance. 1,777. January 21.
Deutsche Gasglühlicht-Auer-Ges. Manufacture of refractory articles of pure oxide of zirconium. 1,766. January 21. (Germany, January 22, 1925.)
Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler. Process for iodising pyridine derivatives. 1,930. January 22. (Germany, January 24, 1925.)
Dreaper, W. P. Artificial silk manufacture. 1,347. January 18.
Dreaper, W. P. Manufacture, etc., of viscose solutions. 1,595. January 20.
Ellis, G. H. Treatment of cellulose derivatives. 1,631. January 20.
Gewerkschaft Sachsen-Weimar. Fixation of nitrogen. 1,439. January 18. (Germany, January 17, 1925.)
Harris, J. E. G., Scottish Dyes, Ltd., Thomas, J., and Wylam, B. Dyes and dyeing. 1,789. January 21.
I.G. Farbenindustrie Akt.-Ges. Treatment of fibrous materials and textiles. 1,388. January 18. (Germany, January 21, 1925.)
I.G. Farbenindustrie Akt.-Ges. Manufacture of preparations of diazo salts for dyeing and printing. 1,525. January 19. (Germany, January 19, 1925.)
I.G. Farbenindustrie Akt.-Ges. Process of obtaining fast coloured discharges on fast dyeings. 1,528. January 19. (Germany, January 19, 1925.)
I.G. Farbenindustrie Akt.-Ges. Process for rendering dusting powders adherent. 1,795. January 21. (Germany, April 3, 1925.)
Lantz, R., Soc. Anon. des Matières Colorantes et Produits Chimiques de Saint-Denis, and Wahl, A., Manufacture of naphthoquinone derivatives. 1,772. January 21. (France, January 21, 1925.)
Lever Bros., Ltd., and MacLennan, K. Treatment of oils and fats. 1,432. January 18.
May and Baker, Ltd., and Newbery, G. Manufacture of amino derivatives of arylarseno compounds. 1,549. January 19.
Ogden, S. A. Manufacture of a cellulose derivative. 1,673. January 20. (Germany, January 20, 1925.)

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.

General Heavy Chemicals

ACID ACETIC, 40% TECH.—£19 per ton.

ACID BORIC, COMMERCIAL.—Crystal, £40 per ton, Powder, £42 per ton.

ACID HYDROCHLORIC.—3s. 9d. to 6s. per carboy d/d, according to purity, strength, and locality.

ACID NITRIC, 80° TW.—£21 10s. to £27 per ton, makers' works, according to district and quality.

ACID SULPHURIC.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations; 140° Tw., Crude Acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.

AMMONIA ALKALI.—£6 15s. per ton f.o.r. Special terms for contracts.

BLEACHING POWDER.—Spot, £9 10s. d/d; Contract, £8 10s. d/d, 4-ton lots.

BISULPHITE OF LIME.—£7 10s. per ton, packages extra, returnable.

BORAX, COMMERCIAL.—Crystal, £25 per ton. Powder, £26 per ton. (Packed in 2-cwt. bags, carriage paid any station in Great Britain.)

CALCIUM CHLORATE (SOLID).—£5 12s. 6d. to £5 17s. 6d. per ton d/d, carr. paid.

COPPER SULPHATE.—£25 to £25 10s. per ton.

METHYLATED SPIRIT 64 O.P.—Industrial, 2s. 5d. to 2s. 11d. per gall. Mineralised, 3s. 8d. to 4s. per gall., in each case according to quantity.

NICKEL SULPHATE.—£38 per ton d/d.

NICKEL AMMONIA SULPHATE.—£38 per ton d/d.

POTASH CAUSTIC.—£30 to £33 per ton.

POTASSIUM BICHROMATE.—4½d. per lb.

POTASSIUM CHLORATE.—3⅞d. per lb., ex wharf, London, in cwt. kegs.

SALAMMONIAC.—£45 to £50 per ton d/d. Chloride of ammonia, £37 to £45 per ton, carr. paid.

SALT CAKE.—£3 15s. to £4 per ton d/d. In bulk.

SODA CAUSTIC, SOLID.—Spot lots delivered, £15 2s. 6d. to £18 per ton, according to strength; 20s. less for contracts.

SODA CRYSTALS.—£5 to £5 5s. per ton ex railway depots or ports.

SODIUM ACETATE 97/98%.—£21 per ton.

SODIUM BICARBONATE.—£10 10s. per ton, carr. paid.

SODIUM BICHROMATE.—3½d. per lb.

SODIUM BISULPHITE POWDER 60/62%.—£17 per ton for home market, 1-cwt. iron drums included.

SODIUM CHLORATE.—3d. per lb.

SODIUM NITRITE, 100% BASIS.—£27 per ton d/d.

SODIUM PHOSPHATE.—£14 per ton, f.o.r. London, casks free.

SODIUM SULPHATE (GLAUBER SALTS).—£3 12s. 6d. per ton.

SODIUM SULPHIDE CONC. SOLID, 60/65.—£13 5s. per ton d/d. Contract, £13. Carr. paid.

SODIUM SULPHIDE CRYSTALS.—Spot, £8 12s. 6d. per ton d/d. Contract, £8 10s. Carr. paid.

SODIUM SULPHITE, PEA CRYSTALS.—£14 per ton f.o.r. London, 1-cwt. kegs included.

Coal Tar Products

ACID CARBOLIC CRYSTALS.—4¾d. to 5¼d. per lb. Crude 60's, 1s. 3½d. to 1s. 6d. Better demand.

ACID CRESYLIC 97/99.—1s. 8d. to 1s. 10d. per gall. Pale, 95%. 1s. 6d. to 1s. 8d. per gall. Dark, 1s. 3d. to 1s. 6d. per gall. Good demand.

ANTHRACENE.—A quality, 3d. to 4d. per unit; Paste 40%, 3d. per unit per cwt. Nominal price.

ANTHRACENE OIL, STRAINED.—7d. to 8d. per gall. Unstrained, 6½d. to 7½d. per gall.

BENZOL.—Crude 65's, 1s. 1d. to 1s. 3½d. per gall., ex works in tank wagons. Standard Motor, 1s. 8d. to 1s. 10d. per gall., ex works in tank wagons. Pure, 1s. 11d. to 2s. per gall., ex works in tank wagons.

TOLUOL.—90%, 1s. 8d. to 1s. 10½d. per gall. Pure, 1s. 11d. to 2s. 3d. per gall.

XYLOL COMMERCIAL.—2s. to 2s. 3d. per gall. Pure, 3s. 3d. per gall.

CREOSOTE.—Cresylic, 20/24%, 8½d. to 10d. per gall. Market very quiet. Standard specification, 6½d. to 6¾d. per gall.; middle oil, heavy, 6½d. to 7d. per gall. Market steady.

NAPHTHA.—Crude, 9d. to 1s. per gall. Solvent 90/160, 1s. 6d. to 1s. 8d. per gall. Steady demand. Solvent 90/190, 1s. to 1s. 2d. per gall.

NAPHTHALENE CRUDE.—Drained Creosote Salts, £3 10s. to £5 15s. per ton. Whizzed or hot pressed, £5 10s. to £7 10s.

NAPHTHALENE.—Crystals and Flaked, £11 10s. to £13 per ton, according to districts.

PITCH.—Medium soft, 58s. to 62s. 6d. per ton, according to district. Market active.

PYRIDINE.—90/160, 19s. 6d. to 21s. per gall. Firmer. Heavy, 7s. to 10s. per gall. More inquiry.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated.

ACETIC ANHYDRIDE 95%.—1s. 7d. per lb.

ACID AMIDONAPHTHOL DISULPHO (1-8-2-4).—10s. 9d. per lb.

ACID ANTHRANILIC.—7s. per lb. 100%.

ACID BENZOIC.—1s. 9d. per lb.

ACID GAMMA.—9s. per lb.

ACID H.—3s. 3d. per lb. 100% basis d/d.

ACID NAPHTHIONIC.—2s. 2d. per lb. 100% basis d/d.

ACID NEVILLE AND WINTHER.—4s. 9d. to 4s. 10d. per lb. 100% basis d/d.

ACID SULPHANILIC.—9d. per lb. 100% basis d/d.

ALUMINIUM CHLORIDE, ANHYDROUS.—10d. per lb. d/d.

ANILINE OIL.—7d. to 7½d. per lb. naked at works.

ANILINE SALTS.—7d. to 8d. per lb. naked at works.

ANTIMONY PENTACHLORIDE.—1s. per lb. d/d.

BENZALDEHYDE.—2s. 1½d. per lb. Good home inquiry.

BENZIDINE BASE.—3s. 3d. per lb. 100% basis d/d.

BENZYL CHLORIDE 95%.—1s. 1d. per lb.

p-CHLORPHENOL.—4s. 3d. per lb. d/d.

p-CHLORANILINE.—3s. per lb. 100% basis.

o-CRESOL 29/31° C.—3d. per lb. Demand quiet.

m-CRESOL 98/100%.—2s. 1d. to 2s. 3d. per lb. Demand moderate.

p-CRESOL 32/34° C.—2s. 1d. to 2s. 3d. per lb. Demand moderate.

DICHLORANILINE.—2s. 3d. per lb.

DICHLORANILINE S. ACID.—2s. 3d. per lb. 100% basis.

DIETHYLANILINE.—4s. 3d. per lb. d/d., packages extra, returnable.

DIMETHYLANILINE.—1s. 11d. to 2s. per lb. d/d. Drums extra.

DINITROBENZENE.—9d. per lb. naked at works.

DINITROCHLORBENZENE.—£84 per ton d/d.

DINITROPHENOL.—1s. 1d. per lb., 100% basis.

DINITROTOLUENE.—48/50° C. 8d. per lb. naked at works. 66/68° C. 9d. per lb. naked at works.

DIPHENYLANILINE.—2s. 10d. per lb. d/d.

G. SALT.—2s. 2d. per lb. 100% basis d/d.

a-NAPHTHOL.—2s. per lb. d/d. Fair home inquiry.

B-NAPHTHOL.—11d. to 1s. per lb. d/d. Fair home inquiry.

a-NAPHTHYLAMINE.—1s. 3d. per lb. d/d. Fair home inquiry.

B.NAPHTHYLAMINE.—3s. 9d. per lb. d/d. Fair home inquiry.

o-NITRANILINE.—5s. 9d. per lb.

m-NITRANILINE.—3s. 6d. per lb. d/d.

p-NITRANILINE.—1s. 9d. to 1s. 10d. per lb. d/d. Fair home inquiry.

NITROBENZENE.—5½d. per lb. naked at works. Good home inquiry.

o-NITROCHLORBENZOL.—2s. 3d. per lb. 100% basis d/d.

NITRONAPHTHALENE.—10d. per lb. d/d.

p-NITROPHENOL.—1s. 9d. per lb. 100% basis d/d.

p-NITRO-*o*-AMIDO-PHENOL.—4s. 6d. per lb. 100% basis.

m-PHENYLENE DIAMINE.—4s. per lb. d/d.

p-PHENYLENE DIAMINE.—9s. 9d. per lb. 100% basis d/d.

R. SALT.—2s. 4d. per lb. 100% basis d/d.

SODIUM NAPHTHIONATE.—1s. 9d. per lb. 100% basis d/d.

o-TOLUIDINE.—9d. per lb. naked at works.

p-TOLUIDINE.—2s. 2d. per lb. naked at works.

m-TOLUYLENE DIAMINE.—4s. per lb. d/d.

m-XYLIDINE ACETATE.—2s. 11d. per lb. 100%.

Wood Distillation Products

ACETATE OF LIME.—Brown, £7 10s. Quiet market. Grey, £15 10s. per ton. Better inquiry. Liquor, 9d. per gall. 32° Tw.

ACETONE.—£81 per ton.

CHARCOAL.—£7 5s. to £9 per ton, according to grade and locality. Demand fair.

IRON LIQUOR.—1s. 6d. per gall. 32° Tw. 1s. 2d. per gall., 24° Tw.

RED LIQUOR.—10d. per gall. 16° Tw.

WOOD CREOSOTE.—2s. 9d. per gall. Unrefined.

WOOD NAPHTHA, MISCIBLE.—3s. 10d. per gall. 60% O.P. Solvent, 4s. 6d. per gall. 40% O.P. Very quiet.

WOOD TAR.—£3 to £4 10s. per ton, according to grade.

BROWN SUGAR OF LEAD.—£42 per ton.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 6d. to 1s. 5d. per lb., according to quality, Crimson, 1s. 3d. to 1s. 7½d. per lb., according to quality.

ARSENIC SULPHIDE, YELLOW.—2s. per lb.

BARYTES.—£3 10s. to £6 15s. per ton, according to quality.

CADMIUM SULPHIDE.—2s. 9d. per lb.

CARBON BISULPHIDE.—£20 to £25 per ton, according to quantity.

CARBON BLACK.—5½d. per lb., ex wharf.

CARBON TETRACHLORIDE.—£50 to £55 per ton, according to quantity, drums extra.

CHROMIUM OXIDE, GREEN.—1s. 2d. per lb.

DIPHENYLGUANIDINE.—3s. 9d. per lb.

INDIARUBBER SUBSTITUTES, WHITE AND DARK.—5¾d. to 6¾d. per lb.

LAMP BLACK.—£35 per ton, barrels free.
LEAD HYPOSULPHITE.—9d. per lb.
LITHOPONE, 30%.—£22 10s. per ton.
MINERAL RUBBER "RUBPRON."—£13 12s. 6d. per ton f.o.r. London.
SULPHUR.—£9 to £11 per ton, according to quality.
SULPHUR CHLORIDE.—4d. per lb., carboys extra.
SULPHUR PRECIP. B.P.—£47 10s. to £50 per ton.
THIOCARBAMIDE.—2s. 6d. to 2s. 9d. per lb. carriage paid.
THIOCARBANILIDE.—2s. 1d. to 2s. 3d. per lb.
VERMILION, PALE OR DEEP.—5s. 3d. per lb.
ZINC SULPHIDE.—1s. 1d. per lb.

Pharmaceutical and Photographic Chemicals

ACID, ACETIC, 80% B.P.—£42 per ton ex wharf London in glass containers.
ACID, ACETYL SALICYLIC.—2s. 4d. to 2s. 7d. per lb. Keen competition met. Good demand.
ACID, BENZOIC B.P.—2s. to 2s. 3d. per lb., according to quantity.
ACID, BORIC B.P.—Crystal, £46 per ton; Powder, £50 per ton. Carriage paid any station in Great Britain, in ton lots.
ACID, CAMPHORIC.—19s. to 21s. per lb.
ACID, CITRIC.—1s. 3½d. to 1s. 4d. per lb., less 5%. Unsettled.
ACID, GALLIC.—2s. 8d. per lb. for pure crystal, in cwt. lots.
ACID, PYROGALLIC, CRYSTALS.—5s. 3d. per lb. Resublimed, 7s.
ACID, SALICYLIC.—1s. 3½d. to 1s. 5d. per lb. Technical.—10½d. to 11d. per lb.
ACID, TANNIC B.P.—2s. 10d. per lb.
ACID, TARTARIC.—1s. 0½d. per lb., less 5%. Market firm.
AMIDOL.—6s. 6d. per lb., d/d.
ACETANILIDE.—1s. 7d. to 1s. 8d. per lb. for quantities.
AMIDOPYRIN.—12s. 6d. per lb.
AMMONIUM BENZOATE.—3s. 3d. to 3s. 6d. per lb., according to quantity.
AMMONIUM CARBONATE B.P.—£37 per ton. Powder, £39 per ton in 5 cwt. casks.
ATROPINE SULPHATE.—11s. per oz. for English make.
BARBITONE.—10s. per lb.
BENZONAPHTHOL.—3s. 3d. per lb. spot.
BISMUTH CARBONATE.—15s. 6d. to 17s. 6d. per lb.
BISMUTH CITRATE.—12s. 9d. to 14s. 9d. per lb.
BISMUTH SALICYLATE.—12s. 6d. to 14s. 6d. per lb.
BISMUTH SUBNITRATE.—13s. to 15s. per lb. according to quantity.
BORAX B.P.—Crystal, £29; Powder, £30 per ton. Carriage paid any station in Great Britain, in ton lots.
BROMIDES.—Potassium, 1s. 9d. to 1s. 11d. per lb.; sodium, 2s. to 2s. 2d. per lb.; ammonium, 2s. 3d. to 2s. 5d. per lb., all spot.
CALCIUM LACTATE.—1s. 4d. to 1s. 5d. Market firmer.
CHLORAL HYDRATE.—3s. 3d. to 3s. 6d. per lb., duty paid.
CHLOROFORM.—2s. 3d. to 2s. 7½d. per lb., according to quantity.
CREOSOTE CARBONATE.—6s. per lb.
FORMALDEHYDE.—£40 per ton, in barrels ex wharf.
GLYCEROPHOSPHATES.—Fair business passing. Calcium, soluble and citrate free, 7s. per lb.; iron, 8s. 9d. per lb.; magnesium, 9s. per lb.; potassium, 50%, 3s. 6d. per lb.; sodium, 60%, 2s. 6d. per lb.
GUAIACOL CARBONATE.—7s. per lb.
HEXAMINE.—2s. 4d. to 2s. 6d. per lb.
HOMATROPINE HYDROBROMIDE.—30s. per oz.
HYDRASTINE HYDROCHLORIDE.—English make offered at 120s. per oz.
HYDROGEN PEROXIDE (12 VOLS.).—1s. 8d. per gallon f.o.r. makers' works, naked.
HYDROQUINONE.—4s. 4¾d. per lb., in cwt. lots.
HYPOPHOSPHITES.—Calcium, 3s. 6d. per lb., for 28-lb. lots; potassium, 4s. 1d. per lb.; sodium, 4s. per lb.
IRON AMMONIUM CITRATE B.P.—2s. to 2s. 3d. per lb. Green, 2s. 4d. to 2s. 9d. per lb. U.S.P., 2s. 1d. to 2s. 4d. per lb.
MAGNESIUM CARBONATE.—Light Commercial, £31 per ton net.
MAGNESIUM OXIDE.—Light Commercial, £67 10s. per ton, less 2½%, price reduced; Heavy Commercial, £23 per ton, less 2½%; Heavy Pure, 2s. to 2s. 3d. per lb., according to quantity.
MENTHOL.—A.B.R. recrystallised B.P., 30s. net per lb., Synthetic, 17s. 6d. to 22s. 6d. per lb., according to quality. English make.
MERCURIALS.—Red oxide, 5s. 5d. to 5s. 7d. per lb.; Corrosive sublimate, 3s. 9d. to 3s. 11d. per lb.; white precipitate, 4s. 6d. to 4s. 8d. per lb.; Calomel, 4s. to 4s. 2d. per lb.
METHYL SALICYLATE.—1s. 7d. per lb.
METHYL SULPHONAL.—16s. 6d. per lb.
METOL.—9s. per lb. British make.
PARAFORMALDEHYDE.—1s. 11d. for 100% powder.
PARALDEHYDE.—1s. 4d. per lb.
PHENACETIN.—4s. to 4s. 3d. per lb.
PHENAZONE.—6s. to 6s. 3d. per lb. Spot lower than forward price.
PHENOLPHTHALEIN.—4s. to 4s. 3d. per lb. Supply exceeds demand.
POTASSIUM BITARTRATE 99/100% (Cream of Tartar).—80s. per cwt., less 2½% for ton lots. Market very firm.
POTASSIUM CITRATE.—1s. 11d. to 2s. 2d. per lb.
POTASSIUM FERRICYANIDE.—1s. 9d. per lb. in cwt. lots. Quiet.
POTASSIUM IODIDE.—16s. 8d. to 17s. 2d. per lb., according to quantity. Steady market.
POTASSIUM METABISULPHITE.—7½d. per lb., 1-cwt. kegs included f.o.r. London.
POTASSIUM PERMANGANATE.—B.P. crystals, 7½d. per lb., spot. slightly easier.
QUININE SULPHATE.—2s. 3d. to 2s. 4d. per oz., in 100 oz. tins. Steady market.
RESORCIN.—3s. 9d. per lb. In fair quantities.
SACCHARIN.—51s. 5d. to 53s. 8d. per lb., according to quantity. Limited inquiry.
SALOL.—3s. per lb.
SILVER PROTEINATE.—12s. per lb. for satisfactory product light in colour.
SODIUM BENZOATE, B.P.—1s. 10d. to 2s. 2d. per lb.
SODIUM CITRATE, B.P.C., 1911.—1s. 8d. to 1s. 11d. per lb., B.P.C., 1923. 1s. 11d. to 2s. 2d. per lb., according to quantity.
SODIUM FERROCYANIDE.—4d. per lb. carriage paid.
SODIUM HYPOSULPHITE, PHOTOGRAPHIC.—£14 to £15 per ton, according to quantity, d/d consignee's station in 1-cwt. kegs.
SODIUM METABISULPHITE CRYSTALS.—37s. 6d. to 60s. per cwt., net cash, according to quantity.
SODIUM NITROPRUSSIDE.—16s. per lb.
SODIUM POTASSIUM TARTRATE (ROCHELLE SALT).—75s. to 80s. per cwt., according to quantity.
SODIUM SALICYLATE.—Powder, 1s. 10d. to 2s. per lb. Crystal, 1s. 11d. to 2s. 1d. per lb. Very heavy demand.
SODIUM SULPHIDE, PURE RECRYSTALLISED.—10d. to 1s. 2d. per lb.
SODIUM SULPHITE, ANHYDROUS, £27 10s. to £28 10s. per ton, according to quantity; 1-cwt. kegs included.
SULPHONAL.—11s. 6d. per lb. Limited demand.
TARTAR EMETIC, B.P.—Crystal or Powder, 1s. 8d. to 1s. 9d. per lb.
THYMOL.—12s. to 13s. 9d. per lb. Strong demand.

Perfumery Chemicals

ACETOPHENONE.—9s. per lb.
AUBEPINE (EX ANETHOL).—9s. 6d. per lb.
AMYL ACETATE.—3s. per lb.
AMYL BUTYRATE.—6s. 6d. per lb.
AMYL SALICYLATE.—3s. 3d. per lb.
ANETHOL (M.P. 21/22° C.).—5s. 6d. per lb.
BENZYL ACETATE FROM CHLORINE-FREE BENZYL ALCOHOL.—2s. 2d per lb.
BENZYL ALCOHOL FREE FROM CHLORINE.—2s. 2d. per lb.
BENZALDEHYDE FREE FROM CHLORINE.—2s. 9d. per lb.
BENZYL BENZOATE.—2s. 9d. per lb.
CINNAMIC ALDEHYDE NATURAL.—18s. per lb.
COUMARIN.—11s. 9d. per lb.
CITRONELLOL.—16s. per lb.
CITRAL.—9s. per lb.
ETHYL CINNAMATE.—9s. per lb.
ETHYL PHTHALATE.—3s. per lb.
EUGENOL.—9s. 6d. per lb.
GERANIOL (PALMAROSA).—22s. 6d. per lb.
GERANIOL.—7s. to 16s. per lb.
HELIOTROPINE.—6s. per lb.
ISO EUGENOL.—14s. 6d. per lb.
LINALOL EX BOIS DE ROSE.—18s. per lb.
LINALYL ACETATE.—18s. per lb.
METHYL ANTHRANILATE.—9s. 3d. per lb.
METHYL BENZOATE.—6s. per lb.
MUSK KETONE.—30s. per lb.
MUSK XYLOL.—5s. 9d. per lb.
NEROLIN.—4s. per lb.
PHENYL ETHYL ACETATE.—12s. per lb.
PHENYL ETHYL ALCOHOL.—9s. 6d. per lb.
RHODINOL.—32s. 6d. per lb.
SAFROL.—1s. 4d. per lb.
TERPINEOL.—1s. 6d. per lb.
VANILLIN.—21s. 6d. to 23s. 6d. per lb. Good demand.

Essential Oils

ALMOND OIL.—12s. 6d. per lb.
ANISE OIL.—3s. 7d. per lb.
BERGAMOT OIL.—26s. per lb.
BOURBON GERANIUM OIL.—13s. per lb.
CAMPHOR OIL.—60s. per cwt.
CANANGA OIL, JAVA.—14s. 6d. per lb.
CINNAMON OIL, LEAF.—5d. per oz.
CASSIA OIL, 80/85%.—10s. per lb.
CITRONELLA OIL.—Java, 85/90%, 3s. 6d. Ceylon, 2s. 6d. per lb.
CLOVE OIL.—7s. 3d. per lb.
EUCALYPTUS OIL, 70/75%.—1s. 10d. per lb.
LAVENDER OIL.—French 38/40%, Esters, 24s. per lb.
LEMON OIL.—8s. 6d. per lb.
LEMONGRASS OIL.—4s. 9d. per lb.
ORANGE OIL, SWEET.—11s. 3d. per lb.
OTTO OF ROSE OIL.—Bulgarian, 60s. per oz. Anatolian, 35s. per oz.
PALMA ROSA OIL.—13s. per lb.
PEPPERMINT OIL.—Wayne County, 125s. per lb. Japanese, 16s. 9d. per lb.
PETITGRAIN OIL.—9s. 6d. per lb.
SANDAL WOOD OIL.—Mysore, 26s. per lb. Australian, 18s. 6d. per lb.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.

London, January 29, 1926.

THERE has been a good volume of business passing during the last week. There are few changes in price to report—on the whole markets are very firm. Export trade has been decidedly better.

General Chemicals

ACETONE is very firm and scarce, particularly for early delivery. Price £81 to £83 per ton.

ACID ACETIC is in good demand, particularly for export. A few adjustments of price of a downward nature have been made with the object of co-relating the prices at various ports. The undertone is very firm.

ACID FORMIC is a firm market at £50 to £51 per ton.

ACID LACTIC is only in moderate request at £43 to £44 per ton for 50 per cent. by weight.

ACID OXALIC is very firm. Price seems likely to advance. Present level is about 3⅞d. per lb.

ACID TARTARIC is quiet and uninteresting. Price nominally 11d. per lb.

ALUMINA SULPHATE is in good demand at about £5 15s. per ton for 17/18%.

AMMONIUM CHLORIDE is still very weak, price nominally £18 per ton.

ARSENIC market is dead, and it is difficult to name a price.

BARIUM CHLORIDE is firm and advancing—supplies are very short for the next two or three months. To-day's figure is £10 to £10 5s. per ton.

BLEACHING POWDER is unchanged.

CREAM OF TARTAR is very scarce for early delivery. Higher prices are expected. To-day's figure, £76 per ton.

EPSOM SALTS are firm at £5 15s. per ton.

FORMALDEHYDE is quiet. There has been some anxiety to unload stocks owing to the nature of the article. The undertone is firm. To-day's quotation is £41 to £42 per ton.

LEAD ACETATE is lower in price at £43 per ton for White and £42 per ton for Brown.

LIME ACETATE is firm and scarce at about £19 per ton.

LITHOPONE is unchanged.

METHYL ALCOHOL is firm at £48 per ton, with little doing.

METHYL ACETONE is advanced to about £57 per ton, and demand is fairly good.

POTASSIUM CARBONATE AND CAUSTIC are unchanged.

POTASSIUM CHLORATE is weak at about 4¼d. per lb.

POTASSIUM PERMANGANATE is a firm market at 7¼d. to 7⅜d. per lb.

POTASSIUM PRUSSIATE is steadier at 7⅞d. to 8d. per lb.

SODIUM ACETATE is scarcer than ever. Price to-day is nominally £20 per ton.

SODIUM BICHROMATE is unchanged.

SODIUM CHLORATE is firmer at 2⅞d. per lb.

SODIUM NITRATE.—Competition is very keen. Price has been reduced to about £21 10s. per ton.

SODIUM PRUSSIATE is firm at 4¼d. to 4½d. per lb.

SODIUM SULPHIDE.—The firm tendency is maintained. To-day's price about £11 15s. per ton.

ZINC SULPHATE is unchanged.

Coal Tar Products

The market generally maintains a firm tone, and thereis no great change to report in prices, with the possible exception of Motor Benzol, the production of which has increased considerably over the last few weeks, and prices have a slightly downward tendency.

90% BENZOL is quoted at 1s. 9d. per gallon on rails, with Motor Benzol a shade less.

PURE BENZOL is quoted at 2s. to 2s. 1d. per gallon, on rails.

CREOSOTE OIL is steady at 6½d. per gallon, on rails in the North, while in London the price is 7⅜d. to 7½d. per gallon.

CRESYLIC ACID is in good demand, and is quoted at 1s. 11d. to 2s. per gallon, on rails, for the pale quality 97/99%, while the Dark quality 95/97% is quoted at 1s. 5d. to 1s. 6d. per gallon.

SOLVENT NAPHTHA is firm at 1s. 5½d. to 1s. 6½d. per gallon, on rails.

HEAVY NAPHTHA is worth about 1s. 2d.per gallon, on rails.

NAPHTHALENES are unchanged. The lower grades are worth from £4 to £4 10s. per ton, the 76/78 quality about £6 per ton and the 74/76 quality about £5 10s. per ton.

PITCH is unchanged. Shipments are still heavy, but the demand is not quite as good as it was recently. To-day's values are 57s. 6d. to 60s. per ton, f.o.b. U.K. ports.

Latest Oil Prices

LONDON.—LINSEED OIL closed steadier, with quotations barely 2s. 6d. lower. Spot, £30 10s.; January, £29; February to April, £29 7s. 6d.; May to August, £29 17s. 6d.; September to December, £30. RAPE OIL quiet. Crude crushed, spot, £48 10s.; technical, refined, £51 10s. COTTON OIL quiet. Refined common edible, £42; Egyptian crude, £35; deodorised, £44. TURPENTINE in active quest at full prices. American, spot, 62s. 9d., paid; 63s., sellers; February to April, 63s. 9d., sellers; May to June, 63s., paid; 63s. 6d. per cwt., sellers.

HULL.—LINSEED OIL, Naked, spot, £30 5s.; January to May-August, £30; COTTON OIL.—Naked Bombay crude, £32; Egyptian, crude, £34; edible refined, £37 5s.; technical, £36. PALM KERNEL OIL, crushed, naked, 5 per cent., £43. GROUND NUT OIL.—Crushed/extracted, £41 15s.; deodorised, £45 15s. SOYA OIL.—Extracted and crushed, £38 10s.; deodorised, £42. RAPE OIL.—Extracted and crushed, £47 per ton, net cash terms, ex mill. CASTOR OIL and COD OIL unchanged.

Nitrogen Products Market

Export.—During the last week there has been considerable demand for sulphate of ammonia from the Far East, though the continental demand still lags. It is anticipated that buyers can hold off no longer, as the consuming season is at hand. British producers are still holding for £12 7s. 6d. per ton, f.o.b. U.K. port, in single bags.

Home.—Home orders are increasing in volume each day, and there is every indication of a heavy season. The demand has set in from Yorkshire and the Western Counties, and it is anticipated that it will become general before the middle of February. Home prices remain unchanged.

Nitrate of Soda.—The market continues quiet, cargoes c.i.f. European ports are still changing hands at about £11 5s. per ton. Stocks are accumulating in Europe, but a big move out to consumers must take place shortly.

Hungary's Chemical Requirements

ACCORDING to the *Seifensieder Zeitung* the following chemicals are required but not manufactured in Hungary: Sulphur, phosphorus, mercury, alkali and alkaline earth metals, caustic potash, caustic soda, barium and aluminium hydroxides, arsenic trioxide, lead oxide, hydrogen superoxide, barium superoxide; chemically pure preparations, such as acids, excepting chemically pure muriatic and sulphuric acid, lyes and salts. Acids: Phosphoric, boracic, tartaric, oxalic, hydrofluoric, citric, benzoic, and sulphurous, also chloride of sulphur, phosgene, etc. Excepting potash, all potash salts, saltpetre, ammonia soda, sodium sulphide, sodium sulphite, sodium permanganate, ammonium carbonate, borax, chromates and acetates of the alkalis, also chromium acetate, potassium borate, potassium cyanide, ammonium nitrate, chloride of calcium and magnesium, chloride of lime, strontium salts, barium sulphide, sulphate and carbonate, calcium sulphite and bisulphite, bone charcoal, calcium carbonate, chloride of iron, nickel sulphate, sugar of lead, zinc sulphide, and antimony sulphide. Coal tar products not manufactured include aniline oil, nitrobenzol, anthracene, carbolic acid, nitrotoluol, pyridin, and formaldehyde. There is also a call for albumen, chloroform, methyl alcohol, acetic acid, xylol, trinitrotoluol, magnesium oxide and carbonate, wolfram and molybdenum acids, vulcanising agents, bromine, iodine and most salts thereof, tannin, and aniline dyes. The list also includes ultramarine, Pompeian red, Schweinfurth green, lanolin, white gelatine, etc.

Increasing Salt Sales

REPORTS from Moscow state that the Solesindikat (Salt Syndicate) proposes to sell during the second quarter of the financial year 1925-26 about 212,800 tons of salt, against 168,000 tons during the same quarter of the previous year, an increase of about 25 per cent. This increase is due partly to the transference to the syndicate of certain districts which previously made independent sales and partly to the growth of the population's purchasing power, which has led to increased demand. The rapidity with which the plan is carried out will depend on transport possibilities.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.

Glasgow, January 29, 1926.

BUSINESS in the Heavy Chemical market continues very satisfactory, good inquiry being received for both prompt and forward delivery.

Prices for most products remain steady, although arsenic is again quoted at slightly less.

Industrial Chemicals

ACID ACETIC 98/100%.—Quoted £55 to £67 per ton according to quantity and packing c.i.f. U.K. port. 80% pure £40 to £41 per ton. 80% technical £38 to £39 per ton packed in casks c.i.f. U.K. ports.

ACID BORIC.—Crystal, granulated, or small flaked £40 per ton; powdered £42 per ton packed in bags, carriage paid U.K. stations.

ACID CARBOLIC, ICE CRYSTALS.—Increased demand and price advanced to about 5d. per lb. delivered or f.o.b. U.K. ports.

ACID CITRIC, B.P. CRYSTALS.—Unchanged at about 1s. $3\frac{3}{8}$d. per lb. less 5% ex wharf, in moderate demand.

ACID FORMIC 85%.—On offer from the Continent at about £49 15s. per ton ex wharf, prompt shipment. Spot material available at about £51 per ton ex store.

ACID HYDROCHLORIC.—In little demand. Price 6s. 6d. per carboy ex works.

ACID NITRIC 80°.—Remains unchanged at £23 5s. per ton ex station, full truck loads.

ACID OXALIC 98/100%.—Continental price unchanged at about $3\frac{1}{2}$d. per lb. ex wharf, prompt shipment. Spot material quoted $3\frac{3}{4}$d. per lb. ex store.

ACID SULPHURIC.—144°, £3 12s. 6d. per ton; 168°, £7 per ton ex works, full truck loads. Dearsenicated quality 20s. per ton more.

ACID TARTARIC, B.P. CRYSTALS.—Usual steady demand and price unchanged at about $11\frac{1}{2}$d. per lb., less 5%, ex wharf.

ALUMINA SULPHATE.—17/18% IRON FREE.—On offer from the Continent at about £5 10s. per ton c.i.f. U.K. ports. Spot material available at £6 5s. per ton ex store.

ALUM, LUMP POTASH.—Quoted £7 15s. per ton c.i.f. U.K. ports, prompt shipment. Spot material available at about £9 2s. 6d. per ton ex store. Powdered quality on offer from the Continent at about £7 10s. per ton c.i.f. U.K. ports.

AMMONIA ANHYDROUS.—Now quoted 1s. $3\frac{1}{2}$d. per lb. ex station, containers extra and returnable.

AMMONIA CARBONATE.—Lump £37 per ton, powdered £39 per ton, packed in 5 cwt. casks delivered U.K. ports.

AMMONIA LIQUID 880°.—Unchanged at about $2\frac{1}{2}$d. to 3d. per lb. delivered, according to quantity.

AMMONIA MURIATE.—Grey galvanisers' crystals of British manufacture quoted £26 to £27 per ton ex station. On offer from the Continent at about £22 10s. per ton c.i.f. U.K. ports. Fine white crystals quoted £18 15s. per ton c.i.f. U.K. ports, prompt shipment from the Continent.

ARSENIC, REFINED WHITE CORNISH.—In little demand. Now quoted about £16 10s. per ton ex wharf to come forward. Spot material available at about £17 10s. per ton ex store.

BARIUM CHLORIDE.—Large white crystals now quoted £9 10s. per ton ex store spot delivery. Continental quotations higher. Large white crystals quoted £8 per ton c.i.f. U.K. ports. Fine white crystals £7 15s. per ton c.i.f. U.K. ports.

BLEACHING POWDER.—English material quoted £9 10s. per ton ex station. Contracts 20s. per ton less. On offer from the Continent at about £7 15s. per ton c.i.f. U.K. ports.

BARYTES.—English material unchanged at £5 5s. per ton ex works. Continental quoted £5 per ton c.i.f. U.K. ports.

BORAX.—Granulated £24 10s. per ton, crystals £25 per ton, powdered £26 per ton, carriage paid U.K. stations.

CALCIUM CHLORIDE.—English manufacturers' price unchanged at £5 12s. 6d. to £5 17s. 6d. per ton carriage paid U.K. stations. Continental available at about £3 17s. 6d. per ton ex wharf.

COPPERAS, GREEN.—In moderate demand for export. Now quoted £3 17s. 6d. per ton f.o.b. U.K. ports.

COPPER SULPHATE.—In good demand for export and price for English material unchanged at £24 per ton f.o.b. U.K. ports. Continental quoted £22 per ton ex wharf.

FORMALDEHYDE 40%.—Spot material now available at about £39 10s. per ton ex store. Offered for prompt shipment at £38 per ton c.i.f. U.K. ports.

GLAUBER SALTS.—English material unchanged at £4 per ton ex store or station. Continental on offer at about £3 per ton c.i.f. U.K. ports.

LEAD, RED.—Imported material quoted £42 5s. per ton ex store.

LEAD, WHITE.—Unchanged at about £42 per ton ex store, spot delivery.

LEAD ACETATE.—Refined white crystals quoted £41 5s. per ton c.i.f. U.K. ports, prompt shipment. Spot material on offer at about £44 5s. per ton ex store.

MAGNESITE, GROUND CALCINED.—In moderate demand and price unchanged at about £8 15s. per ton ex station.

POTASH CAUSTIC 88/92%.—Syndicate prices vary from £25 10s. to £28 15s. per ton c.i.f. U.K. ports, according to quantity and destination. Spot material available at about £29 per ton ex store.

POTASSIUM BICHROMATE.—Unchanged at $4\frac{1}{2}$d. per lb. delivered.

POTASSIUM CARBONATE.—96/98% quality quoted £25 10s. per ton ex wharf, early delivery. Spot material available at about £26 10s. per ton ex store. 90/92% quality quoted £22 10s. per ton c.i.f. U.K. ports.

POTASSIUM CHLORATE 99/100%.—Continental powdered material quoted £29 10s. per ton c.i.f. U.K. ports; crystals about £2 per ton extra.

POTASSIUM NITRATE, SALTPETRE.—Quoted £22 15s. per ton c.i.f. U.K. ports, prompt shipment. Spot material available at about £25 10s. per ton ex store.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Spot material quoted 8d. per lb., ex store. Offered for early delivery at $7\frac{1}{2}$d. per lb., ex wharf.

POTASSIUM PRUSSIATE, YELLOW.—Good inquiry, and price unchanged at about $7\frac{3}{4}$d. per lb., ex store, spot delivery. Offered for prompt shipment from the continent at about $7\frac{5}{8}$d. per lb., c.i.f. U.K. port.

SODA CAUSTIC.—76/77%, £17 10s. per ton; 70/72%, £16 2s. 6d. per ton; broken, 60%, £16 12s. 6d. per ton; powdered, 98/99%, £20 17s. 6d. per ton. All carriage paid U.K. stations, spot delivery; contracts 20s. per ton less.

SODIUM ACETATE.—Quoted £19 5s. per ton, ex store. On offer from the continent at about £18 10s. per ton, c.i.f. U.K. ports.

SODIUM BICARBONATE.—Refined recrystallised quality, £10 10s. per ton, ex quay or station. M.W. quality, 30s. per ton less.

SODIUM BICHROMATE.—English price unchanged at $3\frac{1}{2}$d. per lb. delivered.

SODIUM CARBONATE.—Soda crystals, £5 to £5 5s. per ton, ex quay or station; powdered or pea quality, £1 7s. 6d. per ton more; alkali, 58%, £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—Large crystals of English manufacture quoted £9 per ton, ex station. Minimum, 4-ton lots. Pea crystals, £14 5s. per ton, ex station. Continental commercial quality offered £9 per ton, ex store.

SODIUM NITRATE.—Quoted £13 per ton, ex store; 96/98%, refined quality, 7s. 6d. per ton extra.

SODIUM NITRITE, 100%.—Quoted £24 per ton, ex store. Offered from the continent about £22 5s. per ton, c.i.f. U.K. ports.

SODIUM PRUSSIATE, YELLOW.—Still in good demand. Quoted $4\frac{3}{8}$d. per lb., ex store. On offer from the continent at a fraction less.

SODIUM SULPHATE, SALTCAKE.—Price for home consumption, £3 10s. ton, ex works. Good inquiry for export and higher prices obtainable.

SODIUM SULPHIDE.—60/65%, solid, £13 5s. per ton; broken, £14 5s. per ton; flake, £15 5s. per ton; crystals, 31/34%, £8 12s. 6d. per ton; all delivered buyers' works U.K. Minimum, 5-ton lots, with slight reduction for contracts; 60/62%, solid quality, offered from the continent at about £10 10s. per ton, c.i.f. U.K. ports. Broken, £1 per ton more; crystals, 30/32%, £7 10s. per ton, c.i.f. U.K. ports.

SULPHUR.—Flowers, £11 per ton; roll, £9 15s. per ton; rock, £9 15s. per ton; ground, £9 10s. per ton, ex store, spot delivery. Prices nominal.

ZINC CHLORIDE.—British material, 95/98%, quoted about £24 per ton, f.o.b. U.K. ports; 98/100%, solid, on offer from the continent at about £22 10s. per ton, c.i.f. U.K. ports; powdered about 20s. per ton extra.

ZINC SULPHATE.—Continental manufacture on offer at about £11 per ton, ex wharf.

NOTE.—The above prices are for bulk business, and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

DIMETHYLANILINE.—1s. 11d. to 2s. Some home inquiries.

ORTHONITROTOLUOL.—5d. per lb. Some home inquiries.

BETA NAPHTHOL.—11d. to 1s. per lb. Fair home inquiries.

ALPHA NAPHTHYLAMINE.—2s. per lb. Some home inquiries.

SULPHANILIC ACID.—9d. per lb. Some home inquiries.

Manchester Chemical Market

(From Our Own Correspondent.)

Manchester, January 29, 1926.

There are few new features to report in the chemical market this week. The demand continues on quietly steady lines for most of the leading varieties of chemicals, though buyers generally are not booking very far ahead and for the most part are inclined to restrict transactions to immediate needs. For shipment, sales are slow and buying is limited, on the whole, to the principal lines of "heavies," though a fair number of inquiries on export account continue to come through. Values are steady almost throughout the range of the market, and fluctuations, where any have occurred, are not important.

Heavy Chemicals

Not much business is yet being done in sulphide of soda, but prices are no lower, 60-65 per cent. concentrated solid being still offered at £11 10s. to £11 15s. per ton and commercial material at £9 10s. Bleaching powder is in fair demand at the recent level of £8 10s. per ton. Chlorate of soda is well held at 3¼d. to 3½d. per lb., with demand on a moderate scale. Hyposulphite of soda continues to attract relatively little interest, but quotations are fairly steady, with photographic crystals quoted at £14 5s. and commercial at about £10 per ton. Phosphate of soda is quiet but about unchanged at £12 to £12 5s. per ton. Prussiate of soda attracts a fair amount of attention and prices are maintained at round 4¼d. per lb. Caustic soda is steady and in moderate request at from £15 2s. 6d. per ton for 60 per cent. to £17 10s. for 76-77 per cent. Bicarbonate of soda is unchanged either in position or value at £10 10s. per ton. Soda crystals are steady at £5 5s. per ton and sales are fairly good. Saltcake is still quoted at round £3 per ton, but the demand is slow. Glauber salts are quiet at about £3 5s. per ton. Alkali is firm and in quietly steady request at £6 15s. per ton. Bichromate of soda is rather inactive at 3¼d. per lb. Acetate of soda is well maintained at £18 10s. to £19 per ton.

Permanganate of potash is a slow seller and prices are barely steady, pharmaceutical being quoted at 7¼d. to 7½d. per lb., and commercial at about 5½d. Caustic potash is on the quiet side, and 90 per cent. strength is now on offer at round £28 per ton. Carbonate of potash, 96-98 per cent., continues at about £26 per ton, and the demand is maintained at a fairly good level. Bichromate of potash meets with only a moderate amount of inquiry though prices are held at about 4¼d. per lb. Chlorate of potash is steady and fairly active at 4d. per lb. Prussiate of potash, yellow, is firm at 7¼d. per lb.

Sulphate of copper is still a rather slow section, but quotations are without change at £24 to £24 10s. per ton. Arsenic is arousing only very moderate interest from buyers; prices are still easy though perhaps little changed at about £14 per ton for white powdered, Cornish makes, at works. Epsom salts are still on offer at £3 10s. per ton; magnesium sulphate, B.P. quality, is fairly steady at round £4 10s. Nitrate of lead is in limited inquiry at £40 per ton. Up to now the fluctuations in lead have not been reflected in the prices of the acetates, white being still quoted at about £44 and brown at £39 10s. Acetate of lime keeps quite firm, grey being between £18 and £18 10s. per ton and brown at about £8.

Acids and Coal-Tar Products

There is not much demand about for tartaric acid and the price is rather easy at 11¼d. to 11½d. per lb. A similar position exists with regard to citric acid which has been dealt in in small quantities at 1s. 3d. to 1s. 3¼d. per lb. Oxalic acid is fairly steady at about 3¾d. per lb. Acetic acid has not changed much either, commercial 80 per cent. quality offering at £37 and glacial at £67 to £68.

In coal-tar products the demand is moderate in most lines, though the tendency of prices is steady. Carbolic acid crystals are held at about 5d. per lb., with crude quoted at about 1s. 4½d. per gallon. Pitch is rather slow at the moment, but at 55s. to 57s. 6d. per ton Manchester prices are maintained. Crude naphthalene is in moderate inquiry at from £4 10s. per ton, with refined quiet at £13 to £14. Solvent naphtha is steady at 1s. 5¾d. per gallon and creosote oil at 6¼d.

New Chemical Trade Marks

Applications for Registration

This list has been specially compiled for us by Mr. H. T. P. Gee, Patent and Trade Mark Agent, Staple House, 51 and 52, Chancery Lane, London, W.C.2, from whom further information may be obtained, and to whom we have arranged to refer any inquiries relating to Patents, Trade Marks and Designs.

Opposition to the Registration of the following Trade Marks can be lodged up to February 13, 1926.

"Leaulith"

464,433. For pigments. Class 1. Taylor Bros and Cox, Ltd., 5, Mark Lane, London, E.C.3; manufacturers. November 17, 1925.

"Woodfortis"

464,554. For chemical substances used in manufactures, photography or philosophical research and anti-corrosives. Class 1. The Harvie Corporation, Ltd., Broadway Buildings, Broadway, Westminster, London, S.W.1; manufacturers and merchants. November 21, 1925. (To be Associated, Section 24.)

Opposition to the Registration of the following Trade Marks can be lodged up to February 20, 1926.

"Colorfortis"

464,868. For chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Class 1. The Harvie Corporation, Ltd., Broadway Buildings, Broadway, Westminster, London, S.W.1; manufacturers and merchants. December 1, 1925. (To be Associated. Section 24.)

"Bicento"

465,228. For raw, or partly prepared, vegetable, animal, and mineral substances used in manufactures, not included in other classes. Class 4. Sterns, Ltd., 16, Finsbury Square, London, E.C.2; oil refiners, grease and lubricator manufacturers. December 12, 1925.

Opposition to the Registration of the following Trade Marks can be lodged up to February 27, 1926.

"Faturan."

462,495. For chemical substances, produced from phenol and formaldehyde and analogous substances, for use in manufactures. Class 1. Heinrich Otto Traun, Kamm Co., 59, Meyerstrasse, Hamburg 8, Germany; manufacturer. September 19, 1925. (To be Associated. Sect. 24.)

"Ledergloss."

463,180. For varnish. Class 1. Typke and King, Ltd., Crown Chemical Works, Commonside East, Mitcham Common, Surrey; chemical manufacturers. October 13, 1925.

"Domesticon."

464,148. For glue. Class 1. British Isinglass Co., Ltd., 39, Hope Street, Grimsby; fish by-products manufacturers. November 10, 1925. (To be Associated. Sect. 24.)

"Beta-Borocaine."

465,359. For chemical substances prepared for use in medicine and pharmacy. Class 3. The British Drug Houses, Ltd., 16 to 30, Graham Street, City Road, London, N.1; wholesale druggists. December 17, 1925. (To be Associated. Sect. 24.)

"Clensel."

464,313. For batching oils for use in manufacture. Class 4. John Paterson and Co., Ltd., 16, Henrietta Street, Glasgow, E. Scotland; manufacturing chemists. November 13, 1925. (To be Associated. Sect. 24.)

Tariff Changes

Union of South Africa.—Admission of tar and pitch imported in bulk is now duty free subject to these standards:—Tar shall be genuine liquid tar, yielding not more than 2 per cent. of mineral ash on incineration. Pitch may be soft or hard, yielding not more than 3 per cent. of mineral ash on incineration.

Dominican Republic.—The D.O.T. will supply details of internal taxes levied on articles under such headings as soap, mineral oils, iron and steel, etc.

Poland.—Iron ores and pyrites are free of export duty.

Sierra Leone.—Customs duty on toilet soap is reduced from £1 13s. 4d. to 12s. 6d. per 100 lb. Drugs and medicines containing alcohol and registered in the B.P. are now duty free when imported by registered druggists, practitioners, etc.

Alleged Infringement of Chemical Patent

Acetone and Butyl Alcohol from Grain

MR. JUSTICE ROMER, in the Chancery Division on Friday, January 22, continued the hearing of the action by the Commercial Solvents Corporation, Ltd., against the Synthetic Products Co., Ltd., for an injunction restraining the alleged infringement of their patent, No. 4845 of 1915, for a process for the production of acetone and butyl alcohol; damages, and delivery up of the alleged infringing articles. (See THE CHEMICAL AGE, January 16 and 23.)

Dr. W. Rintoul, F.C.S., and a member of the Council of the Institute of Chemistry, said that he was head of the Research Department of Nobel's Explosives Co., Ltd., Soon after the beginning of the war he was sent to King's Lynn to investigate the defendants' process for the production of acetone from potato mash. He found that nutrient was added, but he was not allowed to examine the fermenting agent. The process was carried on under strict anaerobic conditions, but there were occasional failures due to infection from the air, resulting in the production of butyric acid in place of acetone. Reporting on his inquiries, Dr. Rintoul said that a successful fermentation of potato mash yielded 1·18 per cent. of acetone and 2·81 per cent. of butyl alcohol, and there remained unconverted 25 per cent. of the starch. In 1915 Dr. Weizmann demonstrated his process with maize for acetone production to him in confidence. He was so impressed that he advised Dr. Weizmann to patent it. The process could be carried on with free access of air, whereas at King's Lynn there was trouble owing to infection from the air. Also, Dr. Weizmann's bacilli operated on maize which contained a larger proportion of starch than potatoes. This meant that there would be less difficulty in getting the necessary supplies. From what he saw of the two processes he understood that the bacilli used in them were quite different from each other. As the result of his report to Sir Frederic Nathan, at that time Adviser on Cordite Supplies to the Admiralty, the latter gentleman and Dr. Weizmann met.

Dr. Weizmann Cross-examined

Dr. Weizmann went back into the witness-box and was cross-examined. Asked why he did not patent his process in 1914, he said that his interest in it was technical only, and for that reason he proceeded with his experiments. He did not think he had made an important industrial discovery until he had experimented on a large scale. Asked why he did not give his results to those associated with him, he said that it did not occur to him to do so. The delay in taking out the patent was not due to any doubt that to do so would be unfair to them.

On Monday, before the cross-examination was continued, Mr. Roy Lister Robinson, a member of the Forestry Commission, said in 1915 he paid per odical visits to the defendants' King's Lynn works on behalf of the Ministry of Munitions, and made inspections and reports. The raw material used there for the production of acetone was potatoes only, maize being used only for experimental purposes. The defendants never suggested that they had used it on a manufacturing scale, but they claimed to have had success with it in experiments. Their contract with the Government was to supply 7 tons of acetone a week, but this was never done, and the Government afterwards took the works and operated the Weizmann process there.

Dr. Weizmann, in further cross-examination, said that after he left Dr. Perkin and his group in June, 1912, he did not communicate to them the results of his experiments. They communicated nothing to him and he did not consider himself under any similar obligation. He told Professor Fernbach that he was going on with his work. Re-examined, he said he never received from Professor Fernbach or any other member of the group any information as to the bacterium which could convert the greater part of maize or other grain starch into acetone or butyl alcohol. His information on that point was not carried beyond what he learned during the experiments in Paris in June, 1912.

The last witness for the plaintiffs was Mr. Matthew Atkinson Adam, F.I.C., a patent agent and chemical expert. He said that he was familiar with the allegation that Dr. Weizmann derived his invention from the Strange group. He had made a great many tests of the bacilli "F.B." and "βγ" and his conclusion was that they belonged to different species. In his view the inventive step in Dr. Weizmann's process was the isolation of a bacillus that would ferment the starch of grain (maize, etc.) and convert the greater part of it into acetone and butyl alcohol, would liquefy gelatine, was heat resisting, would produce large yields of the two substances mentioned, and would act under aerobic conditions.

The Defence

For the defence, Mr. Whitehead submitted that the patent was invalid on the construction of the specification. There was insufficiency of description, and there was no limitation as to the use of the bacteria, for the purpose of fermentation, on grains or on natural substances, nor was there any limitation to anaerobic or aerobic conditions. The patent was bad also because there had been prior user by the defendants at Rainham and King's Lynn by means of "X160" and "F.B." The fermentation process was the same as that adopted with the use of "βγ" and "X160" was a bacillus that fulfilled every condition of "βγ." The hearing was adjourned on Thursday.

Company News

W. J. BUSH AND CO.—The directors announce an interim dividend of 3 per cent.

CELLULOSE HOLDINGS AND INVESTMENT.—The extra interest payable to 7 per cent. participating first mortgage debenture stockholders in respect of their participation in profits for the half-year ended December 31, is at the rate of 13s. per cent., free of tax.

BLUNDELL, SPENCE AND CO.—The report for the year ended October 31 last states that a dividend of 9 per cent. on the ordinary shares is recommended; £1,000 is granted to the Longstaff pension fund, and £2,500 placed to the dubious and bad debt account, leaving to be carried forward £22,305.

ENGLISH CHINA CLAYS, LTD.—The directors announce a dividend on the cumulative preference shares at the rate of 7 per cent. per annum for the half-year ended December 31 last, payable on February 1 to all preference shareholders registered on January 25, 1926.

GAS LIGHT AND COKE CO.—The directors recommend the payment of dividends for the half-year to December 31 last on the 4 per cent. consolidated preference stock at the rate of £4 per cent. per annum; on the 3½ per cent. maximum stock at the rate of £3 10s. per cent. per annum, on the ordinary stock at the rate of £4 17s. 4d. per cent. per annum; carrying forward £107,988.

AMALGAMATED ZINC (DE BAVAY'S), LTD.—For the half-year ended June 30 last, the report states that the gross profit on working account was £1,011, and this has been increased by dividends amounting to £19,256, and by £6,087 in respect of interest, discounts, etc. The net amount transferred to appropriation account was £21,254, and the balance brought in of £21,816 made available £43,070, of which £25,000 was absorbed in payment of a dividend of 1s. per share, leaving £18,070 to be carried forward. Since the close of the half-year the 38th dividend of 1s. per share has been declared. Realisations have proceeded, and the surplus of liquid assets at the date of issue of the report was approximately £275,000.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

PARIS GREEN AND LEAD ARSENATE.—A firm of manufacturers' agents in Vancouver who have been associated with the chemical trade for many years desire to represent in Western Canada British manufacturers of above. They formerly represented a Canadian firm who have ceased to manufacture. (Reference No. 82.)

FILTER PRESSES AND OIL TESTERS.—The Public Works Department at Wellington are inviting tenders by March 23 for the supply and delivery C. and F. Auckland of five oil filters, five oil-testing equipments, and five filter paper drying ovens. British made goods. Further particulars from the D.O.T. (Room 50). (Reference No. A.X. 2742.)

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

DISINFECTANTS AND GENERAL PRODUCTS, LTD., 10, Hatton Yard, Hatton Garden. (C.C., 30/1/26.) £11 2s. 4d, December 21.

HILLMAN, GANE AND CO., LTD., 154, Fulham Palace Road, Hammersmith, chemists. (C.C., 30/1/26.) £15 4s. 4d. September 21.

HUTCHINSON, Mr. J. A., Oakleigh, Green Lane, Bolton, tar distiller. (C.C., 30/1/26.) £13 2s. 6d. December 2.

LEIGHTON LABORATORIES, 35, Gray's Inn Road, W.C., manufacturing chemists. (C.C., 30/1/26.) £26 18s. 11d. December 7.

Bill of Sale

HILL, James, 37, Lacey Street, Widnes, sulphate ammonia maker. Filed January 15th. £50.

Mortgages and Charges

*[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]*

CORBYN STACEY AND CO., LTD., London, E., chemists. (M., 30/1/26.) Registered January 12, £1,000 debenture, to W. H. Robertson, Southbeech, Waldegrave Road, Bickley, chemist; general charge (subject to prior charges). *£6,000. March 19, 1925.

JEWSBURY AND BROWN, LTD., Manchester, mineral water manufacturers. (M., 30/1/26.) Registered January 11, £50,000 debentures with premium of 2 per cent. (secured by Trust Deed dated December 29, 1925); charged on properties at Church Stretton, etc. *Nil. April 3, 1925.

London Gazette, &c.

Companies Winding Up Voluntarily

BRIGGS (J. G.) CLEANERS, LTD. (C.W.U.V., 30/1/26.) By special resolution, December 31, confirmed January 18. M. H. Moody, 20, Newgate Street, London, Incorporated Accountant, appointed liquidator. Meeting of creditors at liquidator's office on Wednesday, February 3, 1926, at 4.30 p.m.

McLINTOCK'S PAINT AND COMPOSITIONS CO., LTD. (C.W.U.V., 30/1/26.) By special resolution, December 21, confirmed January 18, W. P. Annear, Mount Stuart House, Cardiff, appointed liquidator. Meeting of creditors at Mount Stuart House, Cardiff, on Tuesday, February 2, at 11 a.m. Creditors' claims by March 5.

RAVENS KINGFIELD, LTD. (C.W.U.V., 30/1/26.) A. H. Ballard, Chartered Accountant, 51–52, Fenchurch Street, London, E.C.3, appointed liquidator, January 21. Meeting of creditors at liquidator's office at 12 noon, Friday, February 5. Creditors' claims by February 15.

Business Name Registered

The following (trading name and address, nature of business, date of commencement, and proprietors' names and addresses) have been registered under the Registration of Business Names Act.

ALEXAL CHEMICAL WORKS, 48, Selden Road, S.E.15, general chemical works. January 4, 1926. A. J. Ingram, 36, Acorn Place, S.E.15, and Robt. J. Edward.

New Company Registered

CROOKSTON BROS., LTD., 38, Grosvenor Gardens, London, S.W. Registered January 21. Manufacturers of and dealers in chemicals, minerals, fertilisers, etc. Nominal capital, £10,000 in £1 shares.

Arsenic Unnecessary in Agriculture

Progress of Less Dangerous Substitutes

THE third scientific meeting of the session of the North British Branch of the Pharmaceutical Society of Great Britain was held at Edinburgh on Friday, January 22. Mr. Alexander M'Cutcheon submitted a paper on "Arsenic: with Special Reference to Its Use in Horticulture and Agriculture."

The use of arsenic in horticulture, said Mr. M'Cutcheon, originated in France in the form of Paris green or arsenite of copper as a wash for fruit trees. This method, from recent incidents, still appeared to be carried out in America, but was stopped in this country some time ago owing to the dangerous after-effects resulting from its use. The film of arsenic left on the skin did not penetrate into the fruit itself, but combined with the skin in such a way that it did not wash off. There were many other insecticidal sprays which were effectual without the disadvantages and risks of arsenic.

The use of arsenic had come prominently before the public in connection with sheep scab. The Board of Agriculture made dipping compulsory and recommended three dips, two containing sulphur and one containing carbolic acid, all of which were good. The Board of Agriculture mentioned arsenical dips, but said the possible danger to human beings made it advisable that they should be compounded by qualified persons only. For other types boilers had to be erected near the baths, involving much labour, time and trouble. This gave the arsenical dips a preference, because, containing arsenic and soda ash, less boiling was necessary. Efficiency was a secondary consideration. There were many losses of sheep due either to arsenical poisoning or to the shock of the dipping process. The newer liquid cresol dips were growing in favour, and were more efficacious. The reason for their increased use, however, was really that they are extremely convenient. Experiments had been made with a mixture containing sublimed sulphur, rape oil, liquid paraffin, and either spirit of tar or solution of cresol. It was not affected by the weather nor washed off by the rain, nor was it syphoned off by the natural action of the wool, with which it appeared to combine and remain without in any way damaging the fleece.

Arsenic in any shape or form, both in horticulture and agriculture, said Mr. M'Cutcheon, was uncalled for, and placed an unnecessary burden and risk on everyone brought into contact with it. This was now generally accepted.

Reported Peat By-Product Project

REPORTS are current that a £100,000 factory is to be erected in Norfolk for the industrial utilisation of peat. Count Louis Hamon, a British subject, is understood to have perfected a treatment of peat which yields activated carbon for the refining of sugar, oils and dyes, and for purifying chemicals at an eighth of the cost of foreign carbons. Other products are reported to include a disinfectant 40 per cent. stronger than carbolic acid and paraffin wax. Orders for large supplies of the carbon are said to have been placed and a temporary factory has been erected at Swinton, Yorkshire. The directors of the new enterprise—the Artificial Coal Co. (Hamon Process), Ltd.—are stated to be the Hon. M. B. Parker, 31, Prince's Gardens, S.W.7 (director, English China Clays, Ltd.); F. Taylor, 43, Bryanston Square, W.1, and of New York (banker and financier); F. W. Cooper, Regent Chambers, Deansgate, Manchester (valuer and assessor to the Corporation of Manchester); H. Milner Willis, 31-32, Budge Row, E.C.4; A. T. M. Jones, 6, Hill Street, Jersey, assistant managing director (director of Hamonite, Ltd.) and Count Louis le Warner Hamon, 21, Park Square, Portland Place, N.W.1, chairman and managing director (director, Spun Concrete Construction Co., Ltd., and the U.K.H. Syndicate, Ltd.). Colonel C. E. P. Sankey is the company's consulting engineer.